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(71)出願人　000001270
コニカ株式会社
東京都新宿区西新宿１丁目26番２号

(72)発明者　岡本　晃
東京都八王子市石川町2970　コニカ株式会社内

(72)発明者　坂田　智志
東京都八王子市石川町2970　コニカ株式会社内

(72)発明者　松平　直
東京都八王子市石川町2970　コニカ株式会社内

(74)代理人　弁理士　鶴若　俊雄

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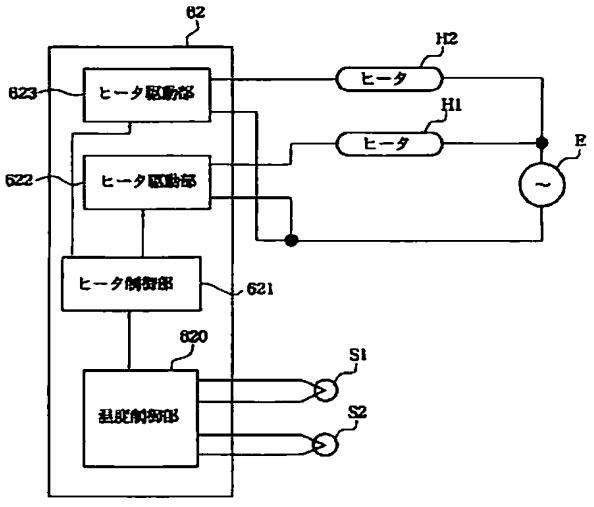
(54)【発明の名称】　ヒータ駆動装置

(57)【要約】

【課題】ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることが可能である。

【解決手段】ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータの駆動開始時、時間Ｔ１の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を１波とし３波に１回駆動する１／３波駆動制御とを組み合わせたヒータの１／３波位相制御Ａを実施し、時間Ｔ２の間、導通角を９０°以下とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂ１を実施し、時間Ｔ３の間、導通角を１８０°未満とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂ２を実施し、時間Ｔ４の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Ｃを、前記１／３波位相制御Ａ、全波位相制御Ｂ１、全波位相制御Ｂ２、ゼロクロス駆動制御Ｃの順に制御する。



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【特許請求の範囲】

【請求項１】ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータの駆動開始時、時間Ｔ１の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を１波とし３波に１回駆動する１／３波駆動制御とを組み合わせたヒータの１／３波位相制御Ａを実施し、時間Ｔ２の間、導通角を９０°以下とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂ１を実施し、時間Ｔ３の間導通角を１８０°未満とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂ２を実施し、時間Ｔ４の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Ｃを、前記１／３波位相制御Ａ、全波位相制御Ｂ１、全波位相制御Ｂ２、ゼロクロス駆動制御Ｃの順に制御することを特徴とするヒータ駆動装置。

【請求項２】前記１／３波位相制御Ａの位相制御部の導通角は、９０°以下とすることを特徴とする請求項１記載のヒータ駆動装置。

【請求項３】前記全波位相制御Ｂ１の時間Ｔ２の時間の時間は、１秒以下とすることを特徴とする請求項１または請求項２記載のヒータ駆動装置。

【請求項４】複数のヒータが存在する場合、１／３波位相制御Ａを実施している時間Ｔ１と、全波位相制御Ｂ１を実施している時間Ｔ２と、全波位相制御Ｂ２を実施している時間Ｔ３の間は、他のヒータの駆動は、オフされていた場合、オンを禁止することを特徴とする請求項１乃至請求項３のいずれかに記載のヒータ駆動装置。

【請求項５】ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータ駆動開始時、時間Ｔ１の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を１波とし３波に１回駆動する１／３波駆動制御とを組み合わせたヒータの１／３波位相制御Ａを実施し、時間Ｔ２の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Ｃを、前記１／３波位相制御Ａ、ゼロクロス駆動制御Ｃの順に制御することを特徴とするヒータ駆動装置。

【請求項６】前記１／３波位相制御Ａの位相制御部の導通角は、９０°以下とすることを特徴とする請求項５記載のヒータ駆動装置。

【請求項７】複数のヒータが存在する場合、１／３波位相制御Ａを実施している時間Ｔ１の間は、他のヒータの駆動は、オフされていた場合、オンを禁止することを特徴とする請求項５または請求項６記載のヒータ駆動装置。

【請求項８】ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータ駆動開始時、所定時間Ｔ１の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を１波とし３波に１回駆動する１／３波駆動制御とを組み合わせたヒータの１／３波位相制御Ａを実施し、所定時間Ｔ２の間、位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂを実施し、所定時間Ｔ３の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Ｃを、前記１／３波位相制御Ａ、全波位相制御Ｂ、ゼロクロス駆動制御Ｃの順に制御することを特徴とするヒータ駆動装置。

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【請求項９】前記１／３波位相制御Ａ、全波位相制御の位相制御部Ｂの導通角は、共に９０°以下とすることを特徴とする請求項８記載のヒータ駆動装置。

【請求項１０】前記全波位相制御Ｂの時間Ｔ２の時間は、１秒以下とすることを特徴とする請求項８または請求項９記載のヒータ駆動装置。

【請求項１１】複数のヒータが存在する場合、前記１／３波位相制御Ａを実施している時間Ｔ１と前記全波位相制御Ｂを実施している時間Ｔ２の間は他のヒータの駆動は、オフされていた場合、オンを禁止することを特徴とする請求項８乃至請求項９のいずれかに記載のヒータ駆動装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】この発明は、ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置に関するものである。

【０００２】

【従来の技術】従来、複写機には、ヒートローラ内部に熱源としてヒータを有する定着装置を備えるものがあり、この定着装置のヒータ駆動は、駆動初期は商用電源の正弦波電源電圧がゼロになるゼロクロスポイントで、その周波数周期の半波２～４回に１～３回ヒータを駆動している。

【０００３】

【発明が解決しようとする課題】従来のヒータ駆動は、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするため、突入電流が発生する。突入電流を抑えるために、正弦波電源電圧の導通角に応じてオンオフするヒータ駆動装置がある。このヒータ駆動装置では、突入電流をある程度まで抑えることができるが、正弦波電源電圧の導通角に応じてオンオフするため、ノイズが発生し電波障害や機器の誤動作を招く恐れがある。

【０００４】この発明は、かかる実情に鑑みてなされたもので、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることが可能なヒータ駆動装置を提供することを目的としている。

【０００５】

【課題を解決するための手段】前記課題を解決し、かつ目的を達成するために、この発明は、以下のように構成した。

【０００６】請求項１記載の発明は、『ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータの駆動開始時、時間Ｔ１の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を１波とし３波に１回駆動する１／３波駆動制御とを組み合わせたヒータの１／３波位相制御Ａを実施し、時間Ｔ２の間、導通角を９０°以下とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂ１を実施し、時間Ｔ３の間、導通角を１８０°未満とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂ２を実施し、時間Ｔ４の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Ｃを、前記１／３波位相制御Ａ、全波位相制御Ｂ１、全波位相制御Ｂ２、ゼロクロス駆動制御Ｃの順に制御することを特徴とするヒータ駆動装置』である。

【０００７】この請求項１記載の発明によれば、ヒータの駆動開始時、時間Ｔ１の間１／３波位相制御Ａを、時間Ｔ２の間全波位相制御Ｂ１を、時間Ｔ３の間全波位相制御Ｂ２を、時間Ｔ４の間ゼロクロス駆動制御Ｃを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【０００８】請求項２記載の発明は『前記１／３波位相制御Ａの位相制御部の導通角は、９０°以下とすることを特徴とする請求項１記載のヒータ駆動装置』である。

【０００９】この請求項２記載の発明によれば、ヒータ駆動開始時、時間Ｔ１の間、１／３波位相制御Ａの位相制御部の導通角は、９０°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００１０】請求項３記載の発明は、『前記全波位相制御Ｂ１の時間Ｔ２の時間の時間は、１秒以下とすることを特徴とする、請求項１または請求項２記載のヒータ駆動装置』である。

【００１１】この請求項３記載の発明によれば、全波位相制御Ｂ１の時間Ｔ２の時間の時間は、１秒以下とすることで、よりノイズを発生を抑え、突入電流を減らすことができる。

【００１２】請求項４記載の発明は、『複数のヒータが存在する場合、１／３波位相制御Ａを実施している時間Ｔ１と、全波位相制御Ｂ１を実施している時間Ｔ２と、全波位相制御Ｂ２を実施している時間Ｔ３の間は、他のヒータの駆動は、オフされていた場合、オンを禁止することを特徴とする請求項１乃至請求項３のいずれかに記載のヒータ駆動装置』である。

【００１３】この請求項４記載の発明によれば、複数のヒータが存在する場合、時間Ｔ１、時間Ｔ２、時間Ｔ３の間は、他のヒータはオフされている場合オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００１４】請求項５記載の発明は、『ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータ駆動開始時、時間Ｔ１の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を１波とし３波に１回駆動する１／３波駆動制御とを組み合わせたヒータの１／３波位相制御Ａを実施し、時間Ｔ２の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Ｃを、前記１／３波位相制御Ａ、ゼロクロス駆動制御Ｃの順に制御することを特徴とするヒータ駆動装置』である。

【００１５】この請求項５記載の発明によれば、ヒータの駆動開始時、時間Ｔ１の間１／３波位相制御Ａを、時間Ｔ２の間ゼロクロス駆動制御Ｃを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００１６】請求項６記載の発明は『前記１／３波位相制御Ａの位相制御部の導通角は、９０°以下とすることを特徴とする請求項５記載のヒータ駆動装置』である。

【００１７】この請求項６記載の発明によれば、ヒータ駆動開始時、時間Ｔ１の間、１／３波位相制御Ａの位相制御部の導通角は、９０°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００１８】請求項７記載の発明は、『複数のヒータが存在する場合、１／３波位相制御Ａを実施している時間Ｔ１の間は、他のヒータの駆動は、オフされていた場合、オンを禁止することを特徴とする請求項５または請求項６記載のヒータ駆動装置』である。

【００１９】この請求項７記載の発明によれば、複数のヒータが存在する場合、時間Ｔ１の間は、他のヒータはオフされている場合オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００２０】請求項８記載の発明は、『ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器のヒータ駆動装置において、ヒータ駆動開始時、所定時間Ｔ１の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を１波とし３波に１回駆動する１／３波駆動制御とを組み合わせたヒータの１／３波位相制御Ａを実施し、所定時間Ｔ２の間、位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂを実施し、所定時間Ｔ３の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Ｃを、前記１／３波位相制御Ａ、全波位相制御Ｂ、ゼロクロス駆動制御Ｃの順に制御することを特徴とするヒータ駆動装置』である。

【００２１】この請求項８記載の発明によれば、ヒータの駆動開始時、時間Ｔ１の間１／３波位相制御Ａを、時

間Ｔ２の間全波位相制御Ｂを、時間Ｔ３の間ゼロクロス駆動制御Ｃを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００２２】請求項９記載の発明は、『前記１／３波位相制御Ａ、全波位相制御の位相制御部Ｂの導通角は、共に９０°以下とすることを特徴とする請求項８記載のヒータ駆動装置』である。

【００２３】この請求項９記載の発明によれば、ヒータ駆動開始時、１／３波位相制御Ａ、全波位相制御の位相制御部Ｂの導通角は、共に９０°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００２４】請求項１０記載の発明は、『前記全波位相制御Ｂの時間Ｔ２の時間は、１秒以下とすることを特徴とする請求項８または請求項９記載のヒータ駆動装置』である。

【００２５】この請求項１０記載の発明によれば、全波位相制御Ｂの時間Ｔ２の時間は、１秒以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００２６】請求項１１記載の発明は、『複数のヒータが存在する場合、前記１／３波位相制御Ａを実施している時間Ｔ１と前記全波位相制御Ｂを実施している時間Ｔ２の間は他のヒータの駆動は、オフされていた場合、オンを禁止することを特徴とする請求項８乃至請求項９のいずれかに記載のヒータ駆動装置』である。

【００２７】この請求項１１記載の発明によれば、複数のヒータが存在する場合、１／３波位相制御Ａを実施している時間Ｔ１と全波位相制御Ｂを実施している時間Ｔ２の間は他のヒータの駆動は、オフされていた場合、オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００２８】

【発明の実施の形態】以下、この発明のヒータ駆動装置の実施の形態を図面に基づいて説明する。

【００２９】図１はヒートローラ内部に熱源としてヒータを有する定着装置を備える機器として複写機の概略構成図である。

【００３０】先ず、この複写機の通常のコピー動作について説明する。この複写機は、画像読み取りユニット１０、ディジタル書き込み系である書き込みユニット２０、画像形成部３０、給紙部４０及び原稿載置部５０等より構成される。

【００３１】複写機上部には、透明なガラス板などからなる原稿台５１と、さらに原稿台５１上に載置した原稿Ｄを覆う原稿カバー５２等からなる原稿載置部５０があり、原稿台５１の下方であって、装置本体内には第１ミラーユニット１２、第２ミラーユニット１３、撮像レンズ１４、ＣＣＤアレイなどの撮像素子１５等からなる画像読み取りユニット１０が設けられている。

【００３２】原稿台５１上の原稿Ｄの画像は、画像読み取りユニット１０の照明ランプ１２Ａと第１ミラー１２Ｂを備える第１ミラーユニット１２の実線から破線にて示す位置への平行移動と、第２ミラー１３Ａ及び第３ミラー１３Ｂを対向して一体的に備える第２ミラーユニット１３の第１ミラーユニット１２に対する１／２の速度の追随移動とにより全面を照明走査され、その画像は撮像レンズ１４により第１ミラー１２Ｂ、第２ミラー１３Ａ、第３ミラー１３Ｂを経て撮像素子１５上へ結像されるようになっている。走査が終わると第１ミラーユニット１２及び第２ミラーユニット１３は元の位置に戻り、次の画像形成まで待機する。

【００３３】撮像素子１５によって光電変換されて得られた画像データはディジタル信号に変換された後、画像信号処理部６０によって画像処理がなされ、画像信号としてメモリ６１に一旦格納される。次いで、画像信号が制御部６２の制御によってメモリ６１より読み出されパルス幅変調された後書き込みユニット２０に入力される。

【００３４】画像形成部３０は、制御部６２の制御によって画像信号が、駆動モータ２７、ポリゴンミラー２２、ｆθレンズ２３、ミラー２４，２５，２６及び図示しない半導体レーザ、補正レンズ２４Ｂ等からなる書き込みユニット２０に入力されると画像記録動作を開始する。すなわち、像担持体である感光体ドラム３１は矢示のように時計方向に回転し、帯電前露光を行って除電する除電は除電器３６によって除電された後、帯電器３２により電荷を与えられているので、書き込みユニット２０によりレーザビームＬによって感光体ドラム３１上には原稿Ｄの像に対応した静電潜像が形成される。その後、感光体ドラム３１上の前記静電的な潜像は、現像器３３のバイアス電圧を印加した現像剤担持体である現像スリーブ３３Ａ上に担持する現像剤によって反転現像が行われ可視のトナー像となる。

【００３５】一方、給紙部４０に装填された給紙カセット４１Ａ又４１Ｂからは指定のサイズの転写紙Ｐを１枚ずつ搬出ローラ４２Ａによって搬出し、搬出ローラ４３及びガイド部材４２を介して画像の転写部に向かって給紙する。給紙された転写紙Ｐは、感光体ドラム３１上のトナー像と同期して作動するレジストローラ４４によって感光体ドラム３１上に送出される。この転写紙Ｐには、転写器３４の作用により、感光体ドラム３１上のトナー像が転写され、分離器３５の除電作用によって感光体ドラム３１上から分離されたのち、搬送ベルト４５を経て定着装置３７へ送られ、定着ローラ１００及び加圧ローラ２００によって溶融定着された後、排紙ローラ３８，４６により装置外のトレイ５４へ排出される。５３は手差し用の給紙台である。

【００３６】前記感光体ドラム３１はさらに回転を続

け、その表面に転写されずに残留したトナーは、クリーニング装置３９において圧接するクリーニングブレード３９Ａにより除去清掃され、再び除電器３６によって除電された後帯電器３２により一様に電荷の付与を受けて、次回の画像形成のプロセスに入る。

【００３７】なお、現像器３３の撹拌スクリュー３３Ｃの底部に設けられた透磁率センサＴＳは現像剤のトナー濃度が変化すると透磁率が変化することを利用して現像器３３内の現像剤のトナー濃度を監視し、制御部６２に現像剤のトナー濃度情報を送出するセンサである。制御部６２は透磁率センサＴＳの情報によりトナー濃度が一定値以下に減少するとトナー補給の指示をトナー補給ユニットに送出してトナー補給を行うので、現像剤のトナー濃度を常に一定に維持することができる。

【００３８】次に、定着装置３７を、図２に基づいて説明する。図２は定着装置を示す断面図である。

【００３９】定着装置３７のケーシング３００内には、加圧ローラ２００とヒートローラを構成する定着ローラ１００とが配置されている。加圧ローラ２００は、ＳＵＳの筒体２３０にシリコンゴム層２３１が設けられ、筒体２３０の内部には１本のヒータＨ１が配置されている。定着ローラ１００は、アルミニウムの筒体１４０に樹脂層１４１をコーティングして設け、アルミニウムの筒体１４０の内部には、２本のヒータＨ２が配置されている。

【００４０】定着ローラ１００には、オイル塗布パッド１５０のオイルがオイル塗布ローラ１５１で塗布され、定着時に記録紙が容易に剥離できるようにしている。また、定着ローラ１００には、クリーニングローラ１５２が接触して配置され、定着ローラ１００に付着する画像を形成するトナーの剥離残やゴミ等を除去する。

【００４１】加圧ローラ２００と定着ローラ１００に対して記録紙の搬送方向上流側には、記録紙の搬送をガイドするガイド板１５３，１５４が設けられ、搬送方向下流側には上定着爪１５５及び下定着爪１５６が設けられている。

【００４２】さらに、加圧ローラ２００の近傍には、加圧ローラ温度検知手段Ｓ１である温度検知センサが設けられ、定着ローラ１００の近傍には、定着ローラ温度検知手段Ｓ２である温度検知センサが設けられ、この温度検知センサから得られる温度情報に基づき、制御部６２により加圧ローラ２００のヒータＨ１及び定着ローラ１００のヒータＨ２の制御を行う。

【００４３】図３はヒータ駆動装置の概略ブロック図である。制御部６２は、温度制御部６２０、ヒータ制御部６２１、ヒータ駆動部６２２，６２３から構成されている。温度制御部６２０は、加圧ローラ温度検知手段Ｓ１及び定着ローラ温度検知手段Ｓ２からの温度情報を得て、それぞれの温度情報をヒータ制御部６２１へ送る。

【００４４】ヒータ制御部６２１は、温度制御部６２０から送られる温度情報に基づき、ヒータ駆動部６２２，６２３を制御する。ヒータ駆動部６２２は、位相制御を実施して加圧ローラ２００のヒータＨ１を駆動する。ヒータ駆動部６２３は、着ローラ１００のヒータＨ２を駆動し、このヒータＨ２は複数の２本である。ヒータＨ１及びヒータＨ２には、商用電源の電源電圧Ｅが印加される。

【００４５】次に、ヒータ制御部６２１の制御を、図４乃至図７に基づいて詳細に説明する。

【００４６】図４は１／３波位相制御Ａを説明する図である。

【００４７】交流の商用電源の電源電圧Ｅが印加され（図４（ａ））、ヒータの駆動開始時、時間Ｔ１の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御（図４（ｂ））と、正弦波の半波を１波とし３波に１回駆動する１／３波駆動制御とを組み合わせたヒータの１／３波位相制御Ａを実施（図４（ｃ））する。

【００４８】図５は全波位相制御Ｂ１を説明する図である。

【００４９】交流の商用電源の電源電圧Ｅが印加され（図５（ａ））、ヒータの駆動開始時、時間Ｔ２の間、導通角を９０°以下とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂ１を実施（図５（ｂ），（ｃ））する。

【００５０】図６は全波位相制御Ｂ２を説明する図である。

【００５１】交流の商用電源の電源電圧Ｅが印加され（図６（ａ））、ヒータの駆動開始時、時間Ｔ３の間、導通角を１８０°未満とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂ２を実施（図６（ｂ），（ｃ））する。

【００５２】図７はゼロクロス駆動制御Ｃを説明する図である。

【００５３】交流の商用電源の電源電圧Ｅが印加され（図７（ａ））、ヒータの駆動開始時、時間Ｔ４の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Ｃを実施（図７（ｂ），（ｃ））する。

【００５４】請求項１乃至請求項４記載の発明は、ヒータの駆動開始時、時間Ｔ１の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を１波とし３波に１回駆動する１／３波駆動制御とを組み合わせたヒータの１／３波位相制御Ａを実施し、時間Ｔ２の間、導通角を９０°以下とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂ１を実施し、時間Ｔ３の間、導通角を１８０°未満とする位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂ２を実施し、時間Ｔ４の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Ｃを、前記１／３波位相制御Ａ、全波位相

制御Ｂ１、全波位相制御Ｂ２、ゼロクロス駆動制御Ｃの順に制御する。

【００５５】このように、ヒータの駆動開始時、時間Ｔ１の間１／３波位相制御Ａを、時間Ｔ２の間全波位相制御Ｂ１を、時間Ｔ３の間全波位相制御Ｂ２を、時間Ｔ４の間ゼロクロス駆動制御Ｃを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００５６】また、１／３波位相制御Ａの位相制御部の導通角は、９０°以下とし、ヒータ駆動開始時、時間Ｔ１の間１／３波位相制御Ａの位相制御部の導通角は、９０°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００５７】また、全波位相制御Ｂ１の時間Ｔ２の時間の時間は、１秒以下とし、全波位相制御Ｂ１の時間Ｔ２の時間の時間は、１秒以下とすることで、よりノイズを発生を抑え、突入電流を減らすことができる。

【００５８】また、複数のヒータが存在する場合、１／３波位相制御Ａを実施している時間Ｔ１と、全波位相制御Ｂ１を実施している時間Ｔ２と、全波位相制御Ｂ２を実施している時間Ｔ３の間は、他のヒータの駆動は、オフされていた場合、オンを禁止し、複数のヒータが存在する場合、時間Ｔ１、時間Ｔ２、時間Ｔ３の間は、他のヒータはオフされている場合オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００５９】請求項５乃至請求項７記載の発明は、ヒータ駆動開始時、時間Ｔ１の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を１波とし３波に１回駆動する１／３波駆動制御とを組み合わせたヒータの１／３波位相制御Ａを実施し、時間Ｔ２の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Ｃを、１／３波位相制御Ａ、ゼロクロス駆動制御Ｃの順に制御する。

【００６０】このように、ヒータの駆動開始時、時間Ｔ１の間１／３波位相制御Ａを、時間Ｔ２の間ゼロクロス駆動制御Ｃを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００６１】また、１／３波位相制御Ａの位相制御部の導通角は、９０°以下とし、ヒータ駆動開始時、時間Ｔ１の間１／３波位相制御Ａの位相制御部の導通角は、９０°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００６２】また、複数のヒータが存在する場合、１／３波位相制御Ａを実施している時間Ｔ１の間は、他のヒータの駆動は、オフされていた場合、オンを禁止し、複数のヒータが存在する場合、時間Ｔ１の間は、他のヒータはオフされている場合オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００６３】請求項８乃至請求項１１記載の発明は、ヒータ駆動開始時、所定時間Ｔ１の間、正弦波電源電圧の導通角によってヒータをオンオフする位相制御と、正弦波の半波を１波とし３波に１回駆動する１／３波駆動制御とを組み合わせたヒータの１／３波位相制御Ａを実施し、所定時間Ｔ２の間、位相制御と全波駆動制御を組み合わせたヒータの全波位相制御Ｂを実施し、所定時間Ｔ３の間、正弦波電源電圧がゼロになるゼロクロスポイントでヒータをオンするゼロクロス駆動制御Ｃを、前記１／３波位相制御Ａ、全波位相制御Ｂ、ゼロクロス駆動制御Ｃの順に制御する。

【００６４】このように、ヒータの駆動開始時、時間Ｔ１の間１／３波位相制御Ａを、時間Ｔ２の間全波位相制御Ｂを、時間Ｔ３の間ゼロクロス駆動制御Ｃを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００６５】また、１／３波位相制御Ａ、全波位相制御の位相制御部Ｂの導通角は、共に９０°以下とし、ヒータ駆動開始時、１／３波位相制御Ａ、全波位相制御の位相制御部Ｂの導通角は、共に９０°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００６６】また、全波位相制御Ｂの時間Ｔ２の時間は、１秒以下とし、全波位相制御Ｂの時間Ｔ２の時間は、１秒以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００６７】また、複数のヒータが存在する場合、１／３波位相制御Ａを実施している時間Ｔ１と全波位相制御Ｂを実施している時間Ｔ２の間は他のヒータの駆動は、オフされていた場合、オンを禁止し、複数のヒータが存在する場合、１／３波位相制御Ａを実施している時間Ｔ１と全波位相制御Ｂを実施している時間Ｔ２の間は他のヒータの駆動は、オフされていた場合、オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００６８】次に、ヒータ制御部６２１の制御の実施例を、図８に基づいて詳細に説明する。

【００６９】ヒータ制御の内容は、以下の通りである。

【００７０】メインヒータＨ２：ヒータ駆動開始時、時間１．５ｓｅｃ間、①１／３波位相制御Ａ実施、時間０．５ｓｅｃ間、②全波位相制御Ｂ１（導通角を７２°）を実施、時間１．０ｓｅｃ間、③全波位相制御Ｂ２（導通角を１４４°）を実施、時間６．０ｓｅｃ間、④ゼロクロス駆動制御Ｃを、①→②→③→④の順に実施する。

【００７１】①、②、③の制御を実施中は、サブヒータＨ２と下ヒータＨ１は、オフの場合、オンを禁止する。

【００７２】サブヒータＨ２：ヒータ駆動開始時、時間

１．５ｓｅｃ間、［Ａ］１／３波位相制御Ａ、１．５ｓｅｃ間、［Ｂ］ゼロクロス駆動制御Ｃを実施し、時間３．３ｓｅｃ間、［Ｃ］ゼロクロス駆動制御Ｃを実施する。［Ａ］，［Ｂ］制御を実施中は、メインヒータＨ２、下ヒータＨ１は、オフの場合、オンを禁止する。

【００７３】下ヒータＨ１：ヒータ駆動開始時、１．５ｓｅｃ間、［Ｄ］１／３波位相制御Ａ実施、１．５ｓｅｃ間、［Ｅ］ゼロクロス駆動制御Ｃを実施し、時間３．３ｓｅｃ間、［Ｆ］ゼロクロス駆動制御Ｃを実施する。［Ｄ］、［Ｅ］制御を実施中は、メインヒータＨ２、サブヒータＨ２は、オフの場合、オンを禁止する。

【００７４】位相制御実施時に、①１／３波位相制御で位相制御のみを実施し、導通角９０°以下にてヒータをオンの場合、突入電流の改善になるが高調波に影響を与える。導通角を９０°以上１８０°未満にてヒータをオンの場合、高調波に影響を与えないが、突入電流の改善も少なくなる。

【００７５】そこで、高調波への影響は少なくし突入電流の改善を行うには、導通角７２°（９０°以下）にし、１／３波駆動と組み合わせた１／３波位相制御を実施する。

【００７６】②全波位相制御（導通角７２°）で①１／３波位相制御後、④ゼロクロス駆動制御、または、全波位相制御（導通角９０°以上１８０°未満）を実施した場合、ヒータの温度が低いため、突入電流が大きい。①１／３波位相制御の時間を延長しても、ヒータの温度は飽和しているため、突入電流は抑えられない。

【００７７】そこで、導通角７２°（導通角９０°以下）の全波位相制御を実施することにより、突入電流は抑えられる。しかし、導通角９０°以下の全波位相制御は、高調波に影響を与えるため、０．５ｓｅｃ以上は延長できない。

【００７８】③全波位相制御（導通角１４４°）で導通角７２°（導通角９０°以下）の全波位相制御後、導通角１４４°（導通角９０°以上１８０°未満）の全波位相制御を実施し、ゼロクロス駆動制御を実施することにより導通角７２°の全波位相制御後に、ゼロクロス駆動制御を実施するより、突入電流を抑えることができる。

【００７９】次に、ＣＥ規格（ＥＮ６１０００－３３）におけるフリッカ規格の対策として、位相制御を実施しＰｌｔ値により評価を行った。

【００８０】

Ｐｌｔ値（長時間フリッカ値）：規格値０．６５以下

Ｐｓｔ値（短時間フリッカ値）：規格値１．００以下

Ｐｌｔ値は、アイドリング中のＰｓｔを１２回＝２時間取り、３乗平均したものである。

【００８１】Ｐｌｔ値は、突入電流による電圧変動から算出した測定値であり、測定結果は、図９のフリッカ測定器により自動測定したものである。

【００８２】フリッカ測定は、オートゲインコントロール回路ＡＧＣを備え、入力電圧の実効値Ｖｒｍｓを、“ΔＶ／Ｖ”に影響を与えることなく基準電圧（本器では試験電圧）に合わせ込む。入力電圧の実効値Ｖｒｍｓの階段状の変動に対し、６０秒の応答時間（変動幅の１０→９０％まで変化する時間）を有する。フリッカ測定器が出力する実効値Ｖｒｍｓの値には、オートゲインコントロール回路ＡＧＣ前／後を選択することができる。前を選択した場合、入力電圧の真の実効値を測定することができる。

【００８３】フリッカとは、発光物の輝度またはスペクトル分布が、時間によって変化するために引き起こされる視覚の不安定な感覚をいい、例えば、照明がちらついて不快な思いをすること等である。これが、照明の電源電圧の変動によって起きる場合、この電圧変動を人の一般的な感覚を基準にして測れるように設計されたのがフリッカメータであり、なお、コイル状フイラメントのランプ（６０Ｗ－２３０Ｖ）によるフリッカを基準としていいる。

【００８４】短期間フリッカ値Ｐｓｔは、短期間（ＩＥＣ規格では１０分間と規定）で測定された、フリッカに対する人の刺激反応性を示す値（フリッカシビアリティ）を短期間フリッカ値Ｐｓｔという。Ｐｓｔ＝１は刺激反応性の一般的な値で、ＩＥＣ規格ではこの値を限度値とする。

【００８５】長期間フリッカ値Ｐｌｔは、長時間（ＩＥＣ規格ではＰｓｔ測定を１２回＝２時間と規定）連続して測定したＰｓｔ値を用いて算出する。これは、人のフリッカに対する刺激反応性を示す値（フリッカシビアリティ）で、長期間フリッカ値Ｐｌｔという。１回の通常使用時間が３０分以下の機器は限度値の適用が免除されます（ＩＥＣ規格で、特に試験することを指示された機器を除く）。

【００８６】フリッカメータは、フリッカの基準とするランプと人の視覚の特性に従って電圧変動に重み付けするフイルタを備えている。このフイルタの出力が重み付け電圧変化“Ｗ－ΔＶ／Ｖ”で、ＩＥＣ規格ではフリッカメータの出力として必要なものである。

【００８７】瞬時フリッカ値Ｓ（ｔ）は、人の平均的知覚感度を尺度とした単位で、人が感じることが可能な最低値を１（Ｐ．Ｕ．）としている。単位Ｐ．Ｕ．はＰｅｒｃｅｐｔｉｂｉｌｉｔｙ　Ｕｎｉｔ（知覚単位）の略である。

【００８８】√Ｓ（ｔ）はＳ（ｔ）の開平で、ΔＶ／Ｖに比例した値を出力する。単位はＲ．Ｕ．である。√Ｓ（ｔ）はＳ（ｔ）の１分間積分値で、単位がＰ．Ｕ．である。

【００８９】累積確率Ｐｉｓ（$P_{0.1}$、$P_{1.0}$、$P_{3.0}$、$P_{10.0}$、$P_{50.0}$）は、瞬時フリッカ値Ｓ（ｔ）を１０２４クラス分類した累積確率曲線から求められ、短期間フリッカ値Ｐｓｔを求めるために使用される。

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【００９０】フリッカＰｓｔ測定モードを以下に示す。

【００９１】動作：〔ＩＥＣ１０００－３－３、８６８、８６８－０の評価方法（フリッカ直接測定の短期間フリッカシビアリティ評価）に適合〕

測定時間：１分間～１５分間（１分間隔）から選択

表示更新レート：測定値は約１回／秒（変動グラフはリアルタイム表示）

測定結果：

①変動グラフ〔基本測定項目（∫Ｓ（ｔ）を除く）の変動グラフ（最大１５分間分）、Ｐｓｔ値と判定結果〕

②測定値〔基本測定項目（√Ｓ（ｔ），∫ｓ（ｔ）除く）の最大値・最小値・平均値、累積確率$P_{0.1}$、P_{1s}、P_{3s}、P_{10s}、P_{50s}、Ｐｓｔ値と判定結果

演算式：

$$Pst = \sqrt{(K_1 P_{0.1} + K_2 P_{1s} + K_3 P_{3s} + K_4 P_{10s} + K_5 P_{50s})}$$

ただし、K_1＝０．０３１４，K_2＝０．０５２５，K_3＝０．０６５７，K_4＝０．２８，K_5＝０．０８

累積確率関数（ＣＰＦ）分類１０２４クラス

各累積確率（Ｐｉ）を線形補間法により求め、更に以下の方法で平滑化した累積確率（Ｐｉｓ）を算出

$P_{1s} = (P_{0.7} + P_1 + P_{10s})/3$，$P_{3s} = (P_{2.2} + P_{3.3} + P_4)/3$

$P_{10s} = (P_6 + P_8 + P_{10} + P_{13} + P_{17})/5$，$P_{50s} = (P_{30} + P_{50} + P_{80})/3$

フリッカＰｌｔ測定モード

動作：〔ＩＥＣ１０００－３－３－８６８．８６８－０の評価方法（フリッカ直接測定の長期間フリッカシビアリティ評価）に適合〕

Ｐｓｔ測定回数Ｎ：２～１００８回から選択

表示更新レート：測定値は約１回／秒（変動グラフはリアルタイム表示）

測定結果：

①変動グラフ〔Ｐｓｔ値の変動グラフ、Ｐｌｔ値と判定結果〕

②測定値〔基本測定項目（√Ｓ（ｔ），∫ｓ（ｔ）除く）の最大値・最小値、Ｐｌｔ値と判定結果〕

③Ｐｓｔリスト〔測定回数分$P_{0.1}$，P_{1s}，P_{3s}，P_{10s}，P_{50s}，Ｐｓｔ値と判定結果〕

演算式：

$$Plt = \sqrt{[(\Sigma (Psti)/N]}$$

ただし、Ｎは測定回数

８５０Ｗの定着のヒータ１本を使用した場合の１／Ｎ波制御測定結果は、表１に示す。

【００９２】表１

【００９３】

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	条件	Plt値
①	ゼロクロス駆動制御	1.364
②	1／2波	0.839
③	1／3波	0.78
④	1／4波	0.899
⑤	2／4波	1.108

【００９４】以上の結果より、３回に１回駆動する１／３波位相制御Ａをヒータ駆動開始時に実施する。

【００９５】１３８０Ｗの定着のヒータにて、１／３波位相制御Ａ、全波位相制御（導通角９０°以下）Ｂ１、全波位相制御（導通角１８０°未満）Ｂ２、ゼロクロス制御Ｃの順にヒータの駆動制御を実施した場合のＰｌｔ測定結果を示す。

【００９６】

①ゼロクロス制御のみの場合：Ｐｌｔ値２．１６１

②上記制御を実施した場合：Ｐｌｔ値０．６２

よって、上記制御を実施することによりフリッカ規格であるＰｌｔ値（０．６５以下）をクリアできフリッカ対応に有効な制御である。

【００９７】

【発明の効果】前記したように、請求項１記載の発明では、ヒータの駆動開始時、時間Ｔ１の間１／３波位相制御Ａを、時間Ｔ２の間全波位相制御Ｂ１を、時間Ｔ３の間全波位相制御Ｂ２を、時間Ｔ４の間ゼロクロス駆動制御Ｃを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００９８】請求項２記載の発明では、ヒータ駆動開始時、時間Ｔ１の間、１／３波位相制御Ａの位相制御部の導通角は、９０°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【００９９】請求項３記載の発明では、全波位相制御Ｂ１の時間Ｔ２の時間の時間は、１秒以下とすることで、よりノイズを発生を抑え、突入電流を減らすことができる。

【０１００】請求項４記載の発明では、複数のヒータが存在する場合、時間Ｔ１、時間Ｔ２、時間Ｔ３の間は、他のヒータはオフされている場合オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【０１０１】請求項５記載の発明では、ヒータの駆動開始時、時間Ｔ１の間１／３波位相制御Ａを、時間Ｔ２の間ゼロクロス駆動制御Ｃを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【０１０２】請求項６記載の発明では、ヒータ駆動開始時、時間Ｔ１の間、１／３波位相制御Ａの位相制御部の導通角は、９０°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることがで

きる。

【０１０３】請求項７記載の発明では、複数のヒータが存在する場合、時間Ｔ１の間は、他のヒータはオフされている場合オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【０１０４】請求項８記載の発明では、ヒータの駆動開始時、時間Ｔ１の間１／３波位相制御Ａを、時間Ｔ２の間全波位相制御Ｂを、時間Ｔ３の間ゼロクロス駆動制御Ｃを、この順に組み合わせて制御することで、ヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【０１０５】請求項９記載の発明では、ヒータ駆動開始時、１／３波位相制御Ａ、全波位相制御の位相制御部Ｂの導通角は、共に９０°以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【０１０６】請求項１０記載の発明では、全波位相制御Ｂの時間Ｔ２の時間は、１秒以下とすることで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

【０１０７】請求項１１記載の発明では、複数のヒータが存在する場合、１／３波位相制御Ａを実施している時間Ｔ１と全波位相制御Ｂを実施している時間Ｔ２の間は他のヒータの駆動は、オフされていた場合、オンを禁止することで、よりヒータ駆動時のノイズの発生を抑え、かつ突入電流を抑えることができる。

＊【図面の簡単な説明】

【図１】ヒートローラ内部に熱源としてヒータを有する定着装置を備える機器として複写機の概略構成図である。

【図２】定着装置を示す断面図である。

【図３】ヒータ駆動装置の概略ブロック図である。

【図４】１／３波位相制御Ａを説明する図である。

【図５】全波位相制御Ｂ１を説明する図である。

【図６】全波位相制御Ｂ２を説明する図である。

【図７】ゼロクロス駆動制御Ｃを説明する図である。

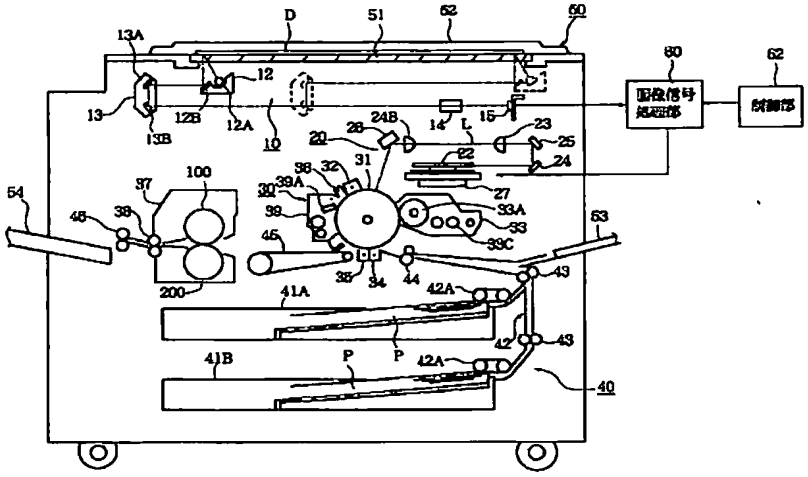
【図８】ヒータ制御部の制御の実施例を説明する図である。

【図９】フリッカ測定器を示すブロック図である。

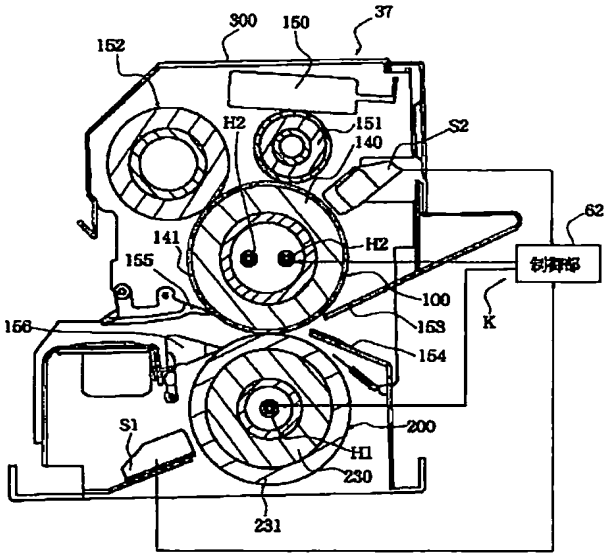
【符号の説明】

６２　制御部
６２０　温度制御部
６２１　ヒータ制御部
６２２，６２３　ヒータ駆動部
Ｓ１　加圧ローラ温度検知手段
Ｓ２　定着ローラ温度検知手段
Ａ　１／３波位相制御
Ｂ１　全波位相制御
Ｂ２　全波位相制御
Ｃ　ゼロクロス駆動制御
Ｈ１　加圧ローラ２００のヒータ
Ｈ２　定着ローラ１００のヒータ

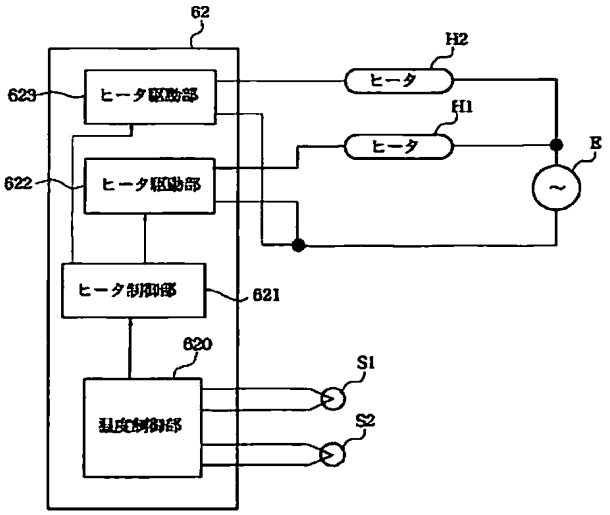
【図１】



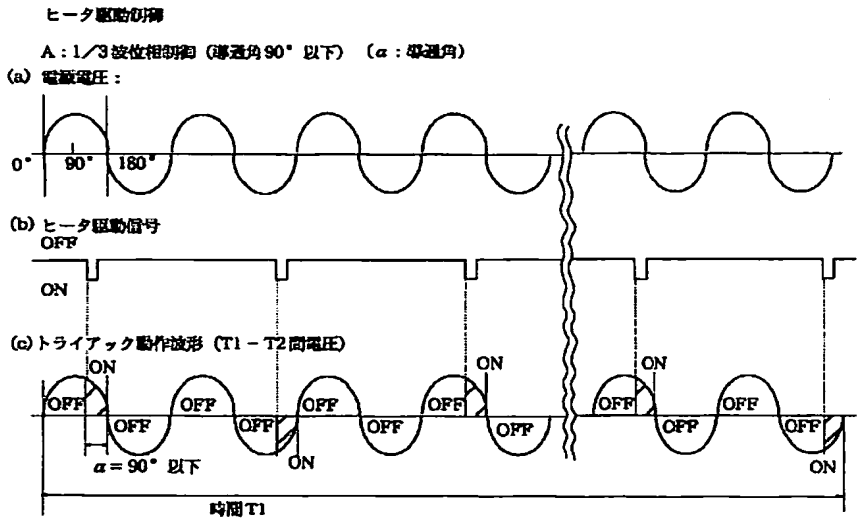
【図２】


300
150
37
152
H2
151
140
S2
62
141
H2
155
制御部
100
K
156
163
154
200
S1
H1
230
231

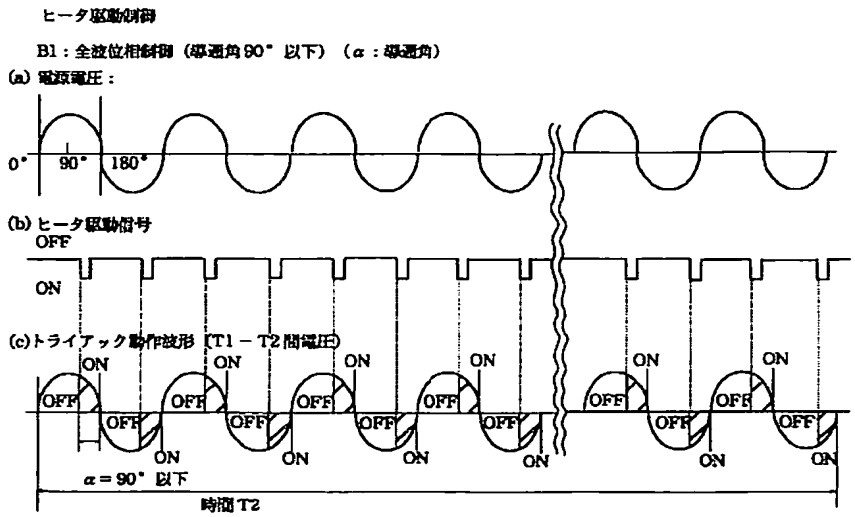
【図３】


62
H2
623
ヒータ駆動部
ヒータ
H1
ヒータ
E
622
ヒータ駆動部
ヒータ制御部
621
620
S1
温度制御部
S2

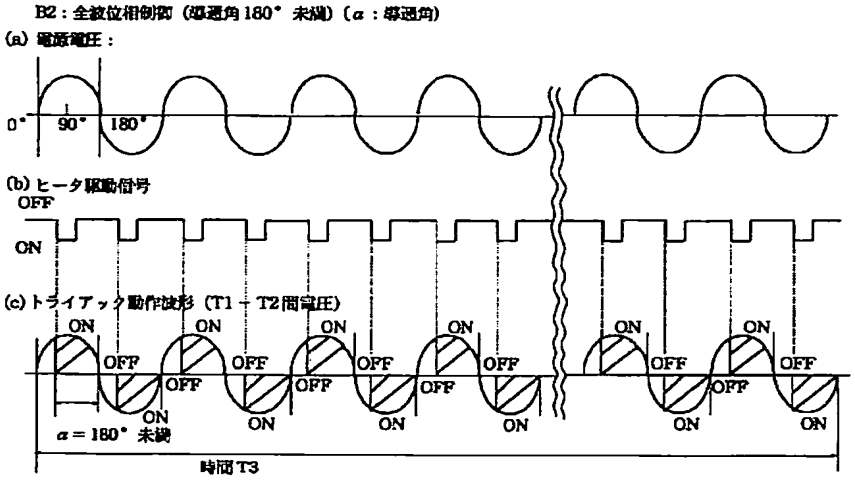
【図４】


ヒータ駆動の制御
A：1／3波位相制御（導通角90°以下）（α：導通角）
(a) 電源電圧：
0°
90°
180°
(b) ヒータ駆動信号
OFF
ON
(c) トライアック動作波形（T1－T2間電圧）
ON
OFF
α＝90°以下
時間T1

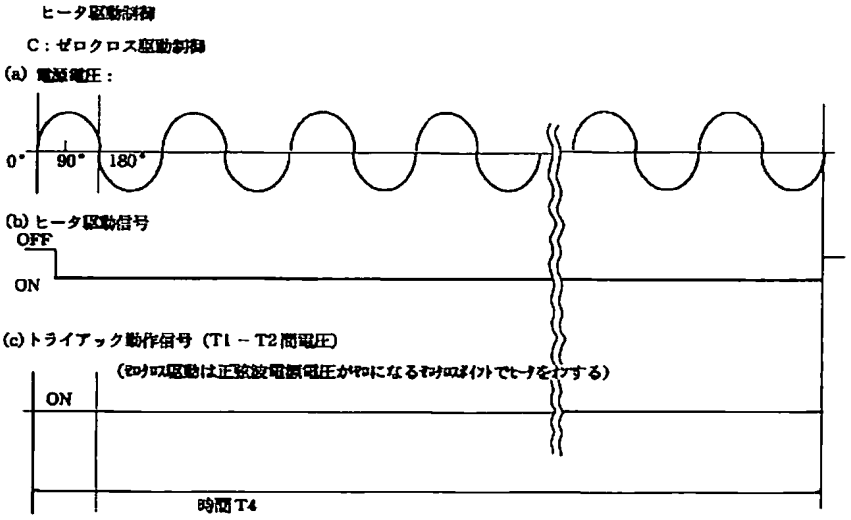
【図５】


ヒータ駆動制御
B1：全波位相制御（導通角90°以下）（α：導通角）
(a) 電源電圧：
0°
90°
180°
(b) ヒータ駆動信号
OFF
ON
(c)トライアック動作波形（T1－T2間電圧）
ON
OFF
α＝90°以下
時間T2

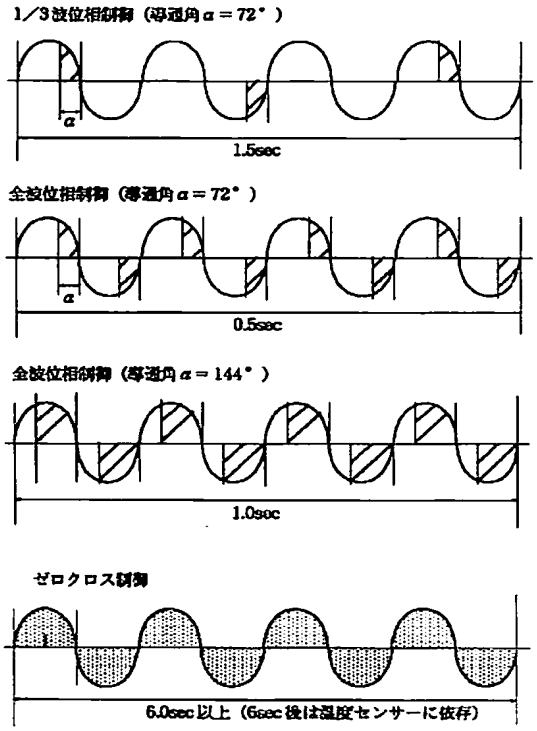
【図６】


ヒータ駆動制御
B2：全波位相制御（導通角180°未満）（α：導通角）
(a) 電源電圧：
0°
90°
180°
(b) ヒータ駆動信号
OFF
ON
(c)トライアック動作波形（T1－T2間電圧）
ON
OFF
α＝180°未満
時間T3

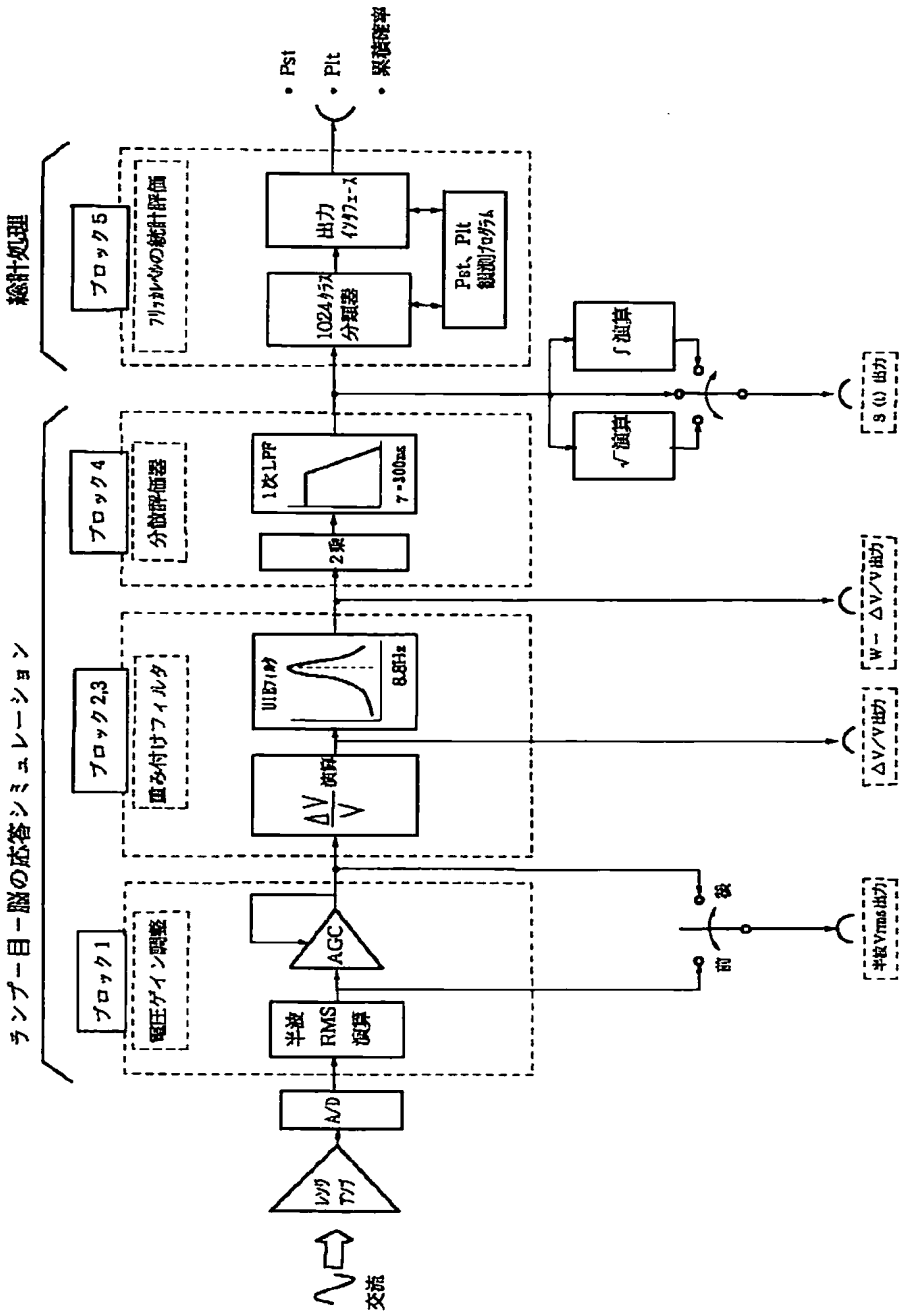
【図７】


ヒータ駆動制御
C：ゼロクロス駆動制御
(a) 電源電圧：
0°
90°
180°
(b) ヒータ駆動信号
OFF
ON
(c) トライアック動作信号（T1－T2間電圧）
（ゼロクロス駆動は正弦波電源電圧がゼロになるゼロのポイントでヒータをオンする）
ON
時間T4

【図８】


1／3波位相制御（導通角α＝72°）
α
1.5sec
全波位相制御（導通角α＝72°）
α
0.5sec
全波位相制御（導通角α＝144°）
1.0sec
ゼロクロス制御
6.0sec以上（6sec後は温度センサーに依存）

【図９】



フロントページの続き

(72)発明者　奥富　隆治
東京都八王子市石川町2970　コニカ株式会社内

(72)発明者　豊泉　卿彦
東京都八王子市石川町2970　コニカ株式会社内

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(71)Applicant : KONICA CORP

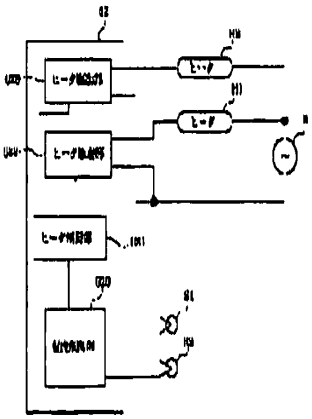
(72)Inventor : OKAMOTO AKIRA
SAKATA TOMOSHI
MATSUDAIRA
SUNAO
OKUTOMI
TAKAHARU
TOYOIZUMI
TERUHIKO

(54) HEATER DRIVING DEVICE

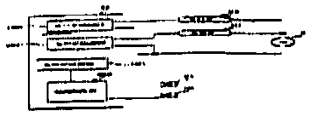
(57)Abstract:

PROBLEM TO BE SOLVED: To suppress noise from being produced when a heater is driven and also to suppress a rush current by executing control by combining 1/3 wave phase control, full-wave phase control and zero cross driving control in this order when starting to drive the heater.

SOLUTION: A heater controlling part 621 controls heater driving parts 622 and 523, based on temperature information from a temperature



controlling part 620. Then, in the starting of driving the heater, the control A that phase control to turn on and off the heater by the



conduction angle of sine wave power source voltage and 1/3 wave driving control to execute one driving in three waves by making the half wave of a sine wave into one wave are combined during time T1, the control B1 that phase control to set the conduction angle to ≦90° and full-wave driving control are combined during the time T2, the control B2 that the phase control to set the conduction angle to <180° and the full-wave driving control are combined during the time T3 and the control C to turn on the heater at a zero cross point at which the sine wave power source voltage becomes zero during the time T4 are executed. Then, the controls are executed in this order.

LEGAL STATUS

[Date of request for examination]

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[Patent number]

[Date of registration]

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[Date of extinction of right]

JP,11-272103,A [CLAIMS] http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web_cgi_ej...

CLAIMS

[Claim(s)]

[Claim 1] In the heater driving gear of the device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of actuation initiation of a heater, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave actuation control is carried out between time amount T2. Full wave phase control B-2 of the heater which combined the phase control which makes the conduction angle between time amount T3 less than 180 degrees, and full wave actuation control is carried out. The heater driving gear characterized by controlling the zero cross actuation control C which turns on a heater on the zero cross point on which sinusoidal supply voltage becomes zero between time amount T four in order of said 1 / 3 wave phase control A, the full wave phase control B1, full wave phase control B-2, and the zero cross actuation control C.

[Claim 2] The conduction angle of the phase control section of said 1 / 3 wave phase control A is a heater driving gear according to claim 1 characterized by considering as 90 degrees or less.

[Claim 3] The time amount of the time amount of the time amount T2 of said full wave phase control B1 is a heater driving gear according to claim 1 or 2 characterized by considering as 1 or less second.

[Claim 4] Actuation of other heaters is the heater driving gear according to claim 1 to 3 characterized by forbidding ON when turned off between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, the time amount T2 which is carrying out full wave phase control B1, and time amount T3 which is carrying out full wave phase control B-2.

[Claim 5] In the heater driving gear of the device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of heater actuation initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. The heater driving gear characterized by controlling the zero cross actuation control C which turns on a heater in order of said 1 / 3 wave phase control A, and the zero cross actuation control C by the zero cross point on which sinusoidal supply voltage becomes ZE opening between time amount T2.

[Claim 6] The conduction angle of the phase control section of said 1 / 3 wave phase control A is a heater driving gear according to claim 5 characterized by considering as 90 degrees or less.

[Claim 7] Actuation of other heaters is the heater driving gear according to claim 5 or 6 characterized by forbidding ON when turned off between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist.

[Claim 8] In the heater driving gear of the device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between predetermined time T1 at the time of heater actuation initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B of the heater which combined phase control and full wave actuation control is carried out between predetermined time T2. The heater driving gear characterized by controlling the zero cross actuation control C which turns on a heater in order of said 1 / 3 wave phase control A, the full wave phase control B, and the zero cross actuation control C by the zero cross point on which sinusoidal supply voltage becomes ZE opening between predetermined time T3.

[Claim 9] Both the conduction angles of the phase control section B of said 1 / 3 wave phase control A, and full wave phase control are heater driving gears according to claim 8 characterized by considering as 90 degrees or less.

[Claim 10] The time amount of the time amount T2 of said full wave phase control B is a heater driving gear according to claim 8 or 9 characterized by considering as 1 or less second.

[Claim 11] It is the heater driving gear according to claim 8 to 9

characterized by forbidding ON when actuation of other heaters is turned off between the time amount T1 which is carrying out said 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out said full wave phase control B.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the heater driving gear of the device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source.
[0002]
[Description of the Prior Art] Conventionally, there is a thing equipped with the anchorage device which has a heater as a heat source inside a heating roller in a copying machine, and heater actuation of this anchorage device is the zero cross point with which the sinusoidal supply voltage of a source power supply becomes zero, and is driving the heater 1 to 3 times to two - four half waves of that frequency period the early stages of actuation.
[0003]
[Problem(s) to be Solved by the Invention] Since the conventional heater actuation turns on a heater on the zero cross point on which sinusoidal supply voltage becomes zero, the rush current generates it. In order to suppress the rush current, there is a heater driving gear turned on and off according to the conduction angle of sinusoidal supply voltage. in this heater driving gear, although the rush current can be suppressed to some extent until, in order to turn on and off according to the conduction angle of sinusoidal supply voltage, there is a possibility of a noise occurring and causing malfunction of an electromagnetic interference or a device.
[0004] This invention aims at offering the heater driving gear which it was made in view of this actual condition, and generating of the noise at the time of heater actuation is suppressed, and can suppress the rush current.
[0005]
[Means for Solving the Problem] In order to solve said technical problem and to attain the object, this invention was constituted as follows.
[0006] In the heater driving gear of the device by which invention according

to claim 1 equips the interior of "heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of actuation initiation of a heater, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave actuation control is carried out between time amount T2. Full wave phase control B-2 of the heater which combined the phase control which makes a conduction angle less than 180 degrees, and full wave actuation control is carried out between time amount T3. time amount -- T four -- between -- a sine wave -- supply voltage -- zero -- becoming -- a zero cross -- the point -- a heater -- turning on -- a zero cross -- actuation -- control -- C -- said -- one -- /-- three -- a wave -- phase control -- A -- a full wave -- phase control -- B -- one -- a full wave -- phase control -- B-2 -- a zero cross -- actuation -- control -- C -- order -- controlling -- things -- the description -- ** -- carrying out -- a heater -- a driving gear -- " -- it is .

[0007] According to this invention according to claim 1, at the time of actuation initiation of a heater, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed by controlling full wave phase control B-2 between time amount T3 for the full wave phase control B1 between time amount T2 in this order, combining the zero cross actuation control C between time amount T four in 1 between time amount T1 / 3 wave phase control A.

[0008] Invention according to claim 2 is "a heater driving gear according to claim 1 characterized by making the conduction angle of the phase control section of said 1 / 3 wave phase control A into 90 degrees or less."

[0009] According to this invention according to claim 2, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by considering as 90 degrees or less at the time of heater actuation initiation.

[0010] Invention according to claim 3 is "a heater driving gear according to claim 1 or 2 characterized by making time amount of the time amount of the time amount T2 of said full wave phase control B1 into 1 or less second."

[0011] According to this invention according to claim 3, by considering as 1 or less second, the time amount of the time amount of the time amount T2 of the full wave phase control B1 can suppress generating for a noise more, and can reduce the rush current.

[0012] The time amount T1 to which invention according to claim 4 is carrying out 1 / 3 wave phase control A when the heater of "plurality exists, a full wave -- phase control -- B -- one -- carrying out -- **** -- time amount -- T -- two -- a full wave -- phase control -- B-2 -- carrying out -- **** -- time amount -- T3 -- between -- others -- a heater -- actuation -- turning off -- having -- **** -- a case -- ON -- forbidding -- things -- the description -- ** -- carrying out -- being according to claim 1 to 3 -- a heater -- a driving gear -- " -- it is .

[0013] When two or more heaters exist according to this invention according to claim 4, by forbidding ON, when other heaters are turned off, generating of the noise at the time of heater actuation can be suppressed more between time amount T1, time amount T2, and time amount T3, and it can suppress the rush current.

[0014] In the heater driving gear of the device by which invention according to claim 5 equips the interior of "heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of heater actuation initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. time amount -- T -- two -- between -- a sine wave -- supply voltage -- ZE -- opening -- becoming -- a zero cross -- the point -- a heater -- turning on -- a zero cross -- actuation -- control -- C -- said -- one -- /-- three -- a wave -- phase control -- A -- a zero cross -- actuation -- control -- C -- order -- controlling -- things -- the description -- ** -- carrying out -- a heater -- a driving gear -- " -- it is .

[0015] According to this invention according to claim 5, at the time of actuation initiation of a heater, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed by controlling 1 between time amount T1 / 3 wave phase control A combining the zero cross actuation control C between time amount T2 in this order.

[0016] Invention according to claim 6 is "a heater driving gear according to claim 5 characterized by making the conduction angle of the phase control section of said 1 / 3 wave phase control A into 90 degrees or less."

[0017] According to this invention according to claim 6, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by considering as 90 degrees or less at the time of heater actuation initiation.

[0018] Invention according to claim 7 is "a heater driving gear according to claim 5 or 6 characterized by forbidding ON between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters

exist when actuation of other heaters is turned off."
[0019] When two or more heaters exist according to this invention according to claim 7, by forbidding ON, when other heaters are turned off, generating of the noise at the time of heater actuation can be suppressed more between time amount T1, and it can suppress the rush current.
[0020] In the heater driving gear of the device by which invention according to claim 8 equips the interior of "heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between predetermined time T1 at the time of heater actuation initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B of the heater which combined phase control and full wave actuation control is carried out between predetermined time T2. predetermined time -- T3 -- between -- a sine wave -- supply voltage -- ZE -- opening -- becoming -- a zero cross -- the point -- a heater -- turning on -- a zero cross -- actuation -- control -- C -- said -- one -- /-- three -- a wave -- phase control -- A -- a full wave -- phase control -- B -- a zero cross -- actuation -- control -- C -- order -- controlling -- things -- the description -- ** -- carrying out -- a heater -- a driving gear -- " -- it is .
[0021] According to this invention according to claim 8, at the time of actuation initiation of a heater, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed by controlling the full wave phase control B between time amount T2 for 1 between time amount T1 / 3 wave phase control A combining the zero cross actuation control C between time amount T3 in this order.
[0022] Invention according to claim 9 is "a heater driving gear according to claim 8 characterized by making both the conduction angles of the phase control section B of said 1 / 3 wave phase control A, and full wave phase control into 90 degrees or less."
[0023] According to this invention according to claim 9, at the time of heater actuation initiation, both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by considering as 90 degrees or less.
[0024] Invention according to claim 10 is "a heater driving gear according to claim 8 or 9 characterized by making time amount of the time amount T2 of said full wave phase control B into 1 or less second."
[0025] According to this invention according to claim 10, by considering as 1 or less second, the time amount of the time amount T2 of the full wave phase control B can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current.
[0026] Invention according to claim 11 is "a heater driving gear according to claim 8 to 9 characterized by forbidding ON between the time amount T1 which is carrying out said 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out said full wave phase control B when actuation of other heaters is turned off."
[0027] Between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist according to this invention according to claim 11, and the time amount T2 which is carrying out full wave phase control B, when turned off, by forbidding ON, actuation of other heaters can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current.
[0028]
[Embodiment of the Invention] Hereafter, the gestalt of operation of the heater driving gear of this invention is explained based on a drawing.
[0029] Drawing 1 is the outline block diagram of a copying machine as a device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source.
[0030] First, the usual copy actuation of this copying machine is explained. This copying machine consists of the image reading unit 10, the write-in unit 20 which is a digital write-in system, the image formation section 30, the feed section 40, and manuscript installation section 50 grade.
[0031] There are the manuscript base 51 which consists of a transparent glass plate etc., and the manuscript installation section 50 which consists of wrap manuscript covering 52 grade the manuscript D further laid on the manuscript base 51 in the copying machine upper part, it is the lower part of the manuscript base 51, and the image reading unit 10 which consists of image sensor 15 grades, such as the 1st mirror unit 12, the 2nd mirror unit 13, the image pick-up lens 14, and a CCD array, is formed in the body of equipment.
[0032] The parallel displacement to the location which shows the image of the manuscript D on the manuscript base 51 with a broken line from the continuous line of the 1st mirror unit 12 equipped with lighting lamp 12A and 1st mirror 12B of the image reading unit 10, Imitation migration of the rate of 1/2 to the 1st mirror unit 12 of the 2nd mirror unit 13 which counters and is equipped with 2nd mirror 13A and 3rd mirror 13B in one carries out the lighting scan of the whole surface. Image formation of the image is carried out on an image sensor 15 through 1st mirror 12B, 2nd mirror 13A, and 3rd mirror 13B with the image pick-up lens 14. After a scan finishes, the 1st mirror unit 12 and the 2nd mirror unit 13 stand by till return and the next image formation in the original location.
[0033] After the image data which photo electric translation was carried out

and was obtained by the image sensor 15 is changed into a digital signal, an image processing is made by the picture signal processing section 60, and it is once stored in memory 61 as a picture signal. Subsequently, a picture signal is inputted into the trailer lump unit 20 in which reading appearance was carried out by control of a control section 62 and by which Pulse Density Modulation was carried out from memory 61.

[0034] The image formation section 30 will start image recording actuation, if a picture signal is inputted into the write-in unit 20 which consists of a drive motor 27, the polygon mirror 22, the ftheta lens 23, mirrors 24, 25, and 26 and semiconductor laser that is not illustrated, correcting lens 24B, etc. by control of a control section 62. That is, the photo conductor drum 31 which is image support rotates clockwise like ****, and since the charge is given to the electric discharge discharge electricity by performing an electrification pre-exposure with the electrification vessel 32 after it is discharged with the electric discharge vessel 36, on the photo conductor drum 31, the electrostatic latent image corresponding to the image of Manuscript D is formed of a laser beam L with the write-in unit 20. Then, with the developer supported on development sleeve 33A which is the developer support which impressed the bias voltage of a development counter 33, reversal development is performed and said electrostatic latent image on the photo conductor drum 31 turns into a visible toner image.

[0035] On the other hand, from sheet paper cassette 41A**41B with which the feed section 40 was loaded, it takes out one sheet at a time the transfer paper P of the appointed size by taking-out roller 42A, and paper is fed toward the imprint section of an image through the taking-out roller 43 and the guide member 42. Therefore, the transfer paper P to which paper was fed is sent out to the resist roller 44 which operates synchronizing with the toner image on the photo conductor drum 31 on the photo conductor drum 31. After the toner image on the photo conductor drum 31 was imprinted by the operation of the imprint machine 34, and being separated into this transfer paper P from on the photo conductor drum 31 by the electric discharge operation of an eliminator 35, being sent to an anchorage device 37 through the conveyance belt 45 and carrying out melting fixation with a fixing roller 100 and the application-of-pressure roller 200, it is discharged with the delivery rollers 38 and 46 to the tray 54 besides equipment. 53 is a feed base for manual bypass.

[0036] said photo conductor drum 31 should boil the toner which remained without continuing a revolution further and the front face imprinting electrification machine 32, after clearance cleaning is carried out by cleaning-blade 39A which carries out a pressure welding in cleaning equipment 39 and electricity is again discharged with the electric discharge vessel 36 -- in response to grant of a charge, it goes into Mr. Lee at the process of next image formation.

[0037] In addition, the permeability sensor TS formed in the pars basilaris ossis occipitalis of stirring screw 33C of a development counter 33 is a sensor which will supervise the toner concentration of the developer in a development counter 33 using permeability changing if the toner concentration of a developer changes, and sends out the toner concentration information on a developer to a control section 62. Since a control section 62 will send out directions of toner makeup to a toner makeup unit and will perform toner makeup if ** RITONA concentration decreases to the information on the permeability sensor TS below at constant value, the toner concentration of a developer is always uniformly maintainable.

[0038] Next, an anchorage device 37 is explained based on drawing 2 . Drawing 2 is the sectional view showing an anchorage device.

[0039] In the casing 300 of an anchorage device 37, the application-of-pressure roller 200 and the fixing roller 100 which constitutes a heating roller are arranged. The silicone rubber layer 231 is formed in the barrel 230 of SUS, and, as for the application-of-pressure roller 200, one heater H1 is arranged inside the barrel 230. A fixing roller 100 coats and forms the resin layer 141 in the barrel 140 of aluminum, and two heaters H2 are arranged inside the barrel 140 of aluminum.

[0040] The oil of the oil spreading pad 150 is applied to a fixing roller 100 with the oil spreading roller 151, and the recording paper enables it to exfoliate easily at the time of fixation. Moreover, to a fixing roller 100, a cleaning roller 152 contacts, and is arranged and ******, dust, etc. of a toner which form the image adhering to a fixing roller 100 are removed.

[0041] The guide plate 153,154 which guides conveyance of the recording paper is formed in the conveyance direction upstream of the recording paper to the application-of-pressure roller 200 and a fixing roller 100, and the up fixation pawl 155 and the bottom fixation pawl 156 are formed in the conveyance direction downstream.

[0042] Furthermore, near the application-of-pressure roller 200, the temperature detection sensor which is the application-of-pressure roller temperature detection means S1 is formed, the temperature detection sensor which is the fixing roller temperature detection means S2 is formed near the fixing roller 100, and the heater H1 of the application-of-pressure roller 200 and the heater H2 of a fixing roller 100 are controlled by the control section 62 based on the temperature information acquired from this temperature detection sensor.

[0043] Drawing 3 is the outline block diagram of a heater driving gear. The control section 62 consists of the temperature control section 620, a heater control section 621, and a heater actuator 622,623. The temperature control section 620 acquires the temperature information from the

application-of-pressure roller temperature detection means S1 and the fixing roller temperature detection means S2, and sends each temperature information to the heater control section 621.

[0044] The heater control section 621 controls the heater actuator 622,623 based on the temperature information sent from the temperature control section 620. The heater actuator 622 carries out phase control and drives the heater H1 of the application-of-pressure roller 200. The heater actuator 623 wears, and drives the heater H2 of a roller 100, and this heater H2 is two or more two. The supply voltage E of a source power supply is impressed to a heater H1 and a heater H2.

[0045] Next, control of the heater control section 621 is explained to a detail based on drawing 4 thru/or drawing 7 .

[0046] Drawing 4 is drawing explaining 1 / 3 wave phase control A.

[0047] The supply voltage E of the source power supply of an alternating current is impressed (drawing 4 (a)), and 1 / 3 wave phase control A of the heater which combined the phase control (drawing 4 (b)) which turns a heater on and off according to the conduction angle of sinusoidal supply voltage, and 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out between time amount T1 at the time of actuation initiation of a heater (drawing 4 (c)).

[0048] Drawing 5 is drawing explaining the full wave phase control B1.

[0049] The supply voltage E of the source power supply of an alternating current is impressed (drawing 5 (a)), and full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave actuation control is carried out between time amount T2 at the time of actuation initiation of a heater (drawing 5 (b), (c)).

[0050] Drawing 6 is drawing explaining full wave phase control B-2.

[0051] The supply voltage E of the source power supply of an alternating current is impressed (drawing 6 (a)), and full wave phase control B-2 of the heater which combined the phase control which makes a conduction angle less than 180 degrees, and full wave actuation control is carried out between time amount T3 at the time of actuation initiation of a heater (drawing 6 (b), (c)).

[0052] Drawing 7 is drawing explaining the zero cross actuation control C.

[0053] The supply voltage E of the source power supply of an alternating current is impressed (drawing 7 (a)), and zero cross actuation control C which turns on a heater on the zero cross point on which sinusoidal supply voltage becomes zero is carried out between time amount T four at the time of actuation initiation of a heater (drawing 7 (b), (c)).

[0054] The phase control to which invention according to claim 1 to 4 turns a heater on and off according to the conduction angle of sinusoidal supply

JP,11-272103,A [DETAILED DESCRIPTION] http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web_cgi_ejje

voltage between time amount T1 at the time of actuation initiation of a heater, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave actuation control is carried out between time amount T2. Full wave phase control B-2 of the heater which combined the phase control which makes a conduction angle less than 180 degrees, and full wave actuation control is carried out between time amount T3. The zero cross actuation control C which turns on a heater is controlled by the zero cross point on which sinusoidal supply voltage becomes zero between time amount T four in order of said 1 / 3 wave phase control A, the full wave phase control B1, full wave phase control B-2, and the zero cross actuation control C.

[0055] Thus, at the time of actuation initiation of a heater, by controlling full wave phase control B-2 between time amount T3 for the full wave phase control B1 between time amount T2 in this order, combining the zero cross actuation control C between time amount T four in 1 between time amount T1 / 3 wave phase control A, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed.

[0056] Moreover, generating of the noise at the time of heater actuation can be suppressed [by making the conduction angle of the phase control section of 1 / 3 wave phase control A into 90 degrees or less] more by making the conduction angle of the phase control section of 1 between time amount T1 / 3 wave phase control A into 90 degrees or less at the time of heater actuation initiation, and the rush current can be suppressed.

[0057] Moreover, time amount of the time amount of the time amount T2 of the full wave phase control B1 is made into 1 or less second, and by considering as 1 or less second, the time amount of the time amount of the time amount T2 of the full wave phase control B1 can suppress generating for a noise more, and can reduce the rush current.

[0058] Moreover, the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, Between the time amount T2 which is carrying out full wave phase control B1, and time amount T3 which is carrying out full wave phase control B-2 When ON is forbidden when turned off, and two or more heaters exist, actuation of other heaters between time amount T1, time amount T2, and time amount T3 By forbidding ON, when turned off, other heaters can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current.

[0059] The phase control to which invention according to claim 5 to 7 turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of heater actuation initiation, 1

/ 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. The zero cross actuation control C which turns on a heater is controlled by the zero cross point on which sinusoidal supply voltage becomes ZE opening between time amount T2 in order of 1 / 3 wave phase control A, and the zero cross actuation control C.

[0060] Thus, at the time of actuation initiation of a heater, by controlling 1 between time amount T1 / 3 wave phase control A combining the zero cross actuation control C between time amount T2 in this order, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed.

[0061] Moreover, generating of the noise at the time of heater actuation can be suppressed [by making the conduction angle of the phase control section of 1 / 3 wave phase control A into 90 degrees or less] more by making the conduction angle of the phase control section of 1 between time amount T1 / 3 wave phase control A into 90 degrees or less at the time of heater actuation initiation, and the rush current can be suppressed.

[0062] Moreover, when ON is forbidden between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist when actuation of other heaters is turned off, and two or more heaters exist, by forbidding ON, when other heaters are turned off, generating of the noise at the time of heater actuation can be suppressed more between time amount T1, and it can suppress the rush current.

[0063] The phase control to which invention according to claim 8 to 11 turns a heater on and off according to the conduction angle of sinusoidal supply voltage between predetermined time T1 at the time of heater actuation initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave actuation control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B of the heater which combined phase control and full wave actuation control is carried out between predetermined time T2. The zero cross actuation control C which turns on a heater is controlled by the zero cross point on which sinusoidal supply voltage becomes ZE opening between predetermined time T3 in order of said 1 / 3 wave phase control A, the full wave phase control B, and the zero cross actuation control C.

[0064] Thus, at the time of actuation initiation of a heater, by controlling the full wave phase control B between time amount T2 for 1 between time amount T1 / 3 wave phase control A combining the zero cross actuation control C between time amount T3 in this order, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed.

[0065] Moreover, generating of the noise at the time of heater actuation can be suppressed [by making both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control into 90 degrees or less] more by making both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control into 90 degrees or less at the time of heater actuation initiation, and the rush current can be suppressed.

[0066] Moreover, generating of the noise at the time of heater actuation can be suppressed more by making time amount of the time amount T2 of the full wave phase control B into 1 or less second by making time amount of the time amount T2 of the full wave phase control B into 1 or less second, and the rush current can be suppressed.

[0067] Moreover, actuation of the heater of others [between / the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out full wave phase control B] When are turned off, and ON is forbidden and two or more heaters exist, Between the time amount T1 which is carrying out 1 / 3 wave phase control A, and the time amount T2 which is carrying out full wave phase control B, when turned off, by forbidding ON, actuation of other heaters can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current.

[0068] Next, the example of control of the heater control section 621 is explained to a detail based on drawing 8 .

[0069] The content of heater control is as follows.

[0070] Maine heater H2: Carry [** full wave phase control B1 (it is a conduction angle 72 degrees)] out ** zero cross actuation control C for ** full wave phase control B-2 (it is a conduction angle 144 degrees) in order of **->**->**->** between operation and time amount 6.0sec between operation and time amount 1.0sec between time amount 1.5sec(s) between **1 / 3 wave phase control A operation, and time amount 0.5sec at the time of heater actuation initiation.

[0071] ** While carrying out control of ** and **, the subheater H2 and the bottom heater H1 forbid ON, when off.

[0072] Subheater H2: At the time of heater actuation initiation, carry out [B] zero cross actuation control C between [A] 1 / 3 wave phase control A, and 1.5sec between time amount 1.5sec(s), and carry out [C] zero cross actuation control C between time amount 3.3sec(s). While carrying out [A] and [B] control, the Maine heater H2 and the bottom heater H1 forbid ON, when off.

[0073] Bottom heater H1: At the time of heater actuation initiation, carry out [E] zero cross actuation control C between 1.5sec(s) between [D] 1 / 3 wave phase control A operation, and 1.5sec, and carry out [F] zero cross actuation control C between time amount 3.3sec(s). While carrying out [D] and [E]

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control, the Maine heater H2 and the subheater H2 forbid ON, when off.
[0074] At the time of phase control implementation, only phase control is carried out by **I / 3 wave phase control, and, in ON of a heater, it becomes an improvement of the rush current at 90 degrees or less of conduction angles, but a higher harmonic is affected. In ON [a conduction angle] of a heater at 90 degrees or more less than 180 degrees, a higher harmonic is not affected, but an improvement of the rush current also decreases.
[0075] Then, in order to lessen and to improve the rush current, effect on a higher harmonic is used as 72 degrees (90 degrees or less) of conduction angles, and carries out 1 / 3 wave phase control combined with 1 / 3 wave actuation.
[0076] ** When ** zero cross actuation control or full wave phase control (less than 180 degrees of 90-degree or more conduction angles) is carried out after **I / 3 wave phase control by full wave phase control (72 degrees of conduction angles), since the temperature of a heater is low, the rush current is large. ** Even if it extends the time amount of I / 3 wave phase control, since the temperature of a heater is saturated, the rush current is not suppressed.
[0077] Then, the rush current is suppressed by carrying out full wave phase control of 72 degrees of conduction angles (90 degrees or less of conduction angles). However, since the full wave phase control of 90 degrees or less of conduction angles affects a higher harmonic, 0.5 or more secs are inextensible.
[0078] ** By carrying out full wave phase control of 144 degrees of conduction angles (less than 180 degrees of 90-degree or more conduction angles) by full wave phase control (144 degrees of conduction angles) after the full wave phase control of 72 degrees of conduction angles (90 degrees or less of conduction angles), and carrying out zero cross actuation control, the rush current can be suppressed rather than it carries out zero cross actuation control after the full wave phase control of 72 degrees of conduction angles.
[0079] Next, as a cure of the flicker specification in CE specification (EN 61000-33), phase control was carried out and the Plt value estimated.
[0080]
Plt value (long duration flicker value): -- 0.65 or less value-of-standard Pst value (short-time flicker value): -- a 1.00 or less value-of-standard Plt value takes Pst under idling for 12 times = 2 hours, and carries out a cube average.

[0081] A Plt value is the measured value computed from the voltage variation by the rush current, and a measurement result is measured automatically with the flicker measuring instrument of drawing 9 .
[0082] Flicker measurement is equipped with the automatic gain control circuit AGC, and it doubles the actual value Vrms of input voltage with reference voltage (the present instrument test voltage), without affecting "deltaV/V." It has the response time for 60 seconds (time amount which changes to 10->90% of the range of fluctuation) to stair-like fluctuation of the actual value Vrms of input voltage. Before automatic gain control circuit AGC / back can be chosen as the value of the actual value Vrms which a flicker measuring instrument outputs. When a front is chosen, the true RMS of input voltage can be measured.
[0083] A flicker is saying the unstable sensation of the vision to which the brightness or spectrum distribution of a luminescence object is caused in order to change with time amount, for example, lighting's flickering, and feeling unpleasant etc. When this occurs by fluctuation of the supply voltage of lighting, it is flicker meter, and in addition, having been designed so that this voltage variation could be measured on the basis of people's general sensation is based on the flicker with the lamp (60W-230V) of a coiled form filament, and it is.
[0084] The short flicker value Pst calls the value (flicker severe RITI) which shows people's sensitivity over a flicker measured for a short period of time (IEC standards prescribe for 10 minutes) the short flicker value Pst. Pst=I is the general value of sensitivity and makes this value a limit value in IEC standards.
[0085] A flicker value Plt is computed for a long period of time using the measured Pst value which carried out long duration (Pst measurement is specified as 12 time =2 hour by IEC standards) continuation. This is the value (flicker severe RITI) which shows the sensitivity over people's flicker, and calls it a flicker value Plt for a long period of time. Application of a limit value is exempted from the device for 30 or less minutes to 1 time of a usual time (except for the device to which it is IEC standards and having examined especially was directed).
[0086] Flicker meter is equipped with the filter which carries out weighting to voltage variation according to the property of the vision of the lamp made into the criteria of a flicker, and a man. The output of this filter is weighting electrical-potential-difference change "W-delta V/V", and is required of IEC standards as an output of flicker meter.
[0087] Instant flicker value S (t) is the unit which made people's average perception sensibility the scale, and is setting to 1 (P. U.) the minimum value in which what people sense is possible. Unit P.U. is Perceptibility. It is the abbreviation for Unit (perception unit).
[0088] rootS (t) is the extraction of the square root of S (t), and outputs the value proportional to deltaV/V. A unit is R.U. rootS (t) is the I minute integral value of S (t), and a unit is P.U.
[0089] the accumulation probability music into which the accumulation

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probability Pis (P0.1, P1s, P3s, P10s, P50s) classified 1024 classes instant flicker value S (t) -- it is used in order to ask and to calculate the short flicker value Pst, since green.

[0090] Flicker Pst measurement mode is shown below.

[0091] Actuation: It is adaptation] to the assessment approach (short flicker severe RITI assessment of flicker direct measurement) of [IEC 1000-3-3,868,868-0.

measuring-time: -- renewal rate of the selection display from for [between / I part / -] 15 minutes (I part spacing): -- measured value -- about I times (a fluctuation graph is a real-time display)/second

Measurement result: ** fluctuation graph [the fluctuation graph (a part for for a maximum of 15 minutes) of a basic parameter (except for integralS (t)), a Pst value, and a judgment result]

** The maximum, minimum value and average, accumulation probability P0.1, P1s, P3s, P10s, P50s, and Pst value and judgment result operation expression of a measured-value [basic parameter (integrals [rootS (t) and] (t) remove) :P st=root (K1P0.1+K2P1 S+K3P3 S+K4P 10 S+K5P50S) However, K1=0.0314, K2=0.0525, K3=0.0657, K4=0.28, and K5=0.08 accumulation probability function (CPF) classification 1024 class each accumulation probability (Pi) are searched for by the linear interpolation method. Furthermore, the accumulation probability (Pis) graduated by the following approaches Calculation P1S= (P0.7+P1+P105)/3, P3S= (P2.2+P33+P4) / 3P10S= It is adaptation] to (P6+P8+P10+P13+P17)/5 and the assessment approach (prolonged flicker severe RITI assessment of flicker direct measurement) of p50s=(P30+P50+P80)/3 flicker Plt measurement mode actuation:[IECI 000-3-3-868.868-0.

From N:two - 1008 Pst measurement counts to the renewal rate of a selection display: Measured value is about I times (a fluctuation graph is a real-time display)/second.

Measurement result: ** fluctuation graph [the fluctuation graph of a Pst value, a Plt value, and a judgment result]

** Measured value [the maximum and the minimum value of a basic parameter (integrals [rootS (t) and] (t) remove), a Plt value, and a judgment result]

** It is P0.1, P1S, P3S, P10S, P50S, Pst value, and judgment result] by the Pst list [measurement count.

Operation expression-It=root[(sigma (Psti) / N])

However, a 1-/N wave control measurement result when N uses one heater of fixation of measurement count 850W is shown in a table 1.

[0092] Table 1 [0093]

	条件	Plt値
①	ゼロクロス駆動制御	1.364
②	1/2波	0.839
③	1/3波	0.78
④	1/4波	0.899
⑤	2/4波	1.108

[0094] From the above result, 1 / 3 wave phase control A driven once to 3 times are carried out at the time of heater actuation initiation.

[0095] The Plt measurement result at the time of carrying out actuation control of a heater at the heater of fixation of 1380W in order of 1 / 3 wave phase control A, the full wave phase control (90 degrees or less of conduction angles) B1, full wave phase control (less than 180 degrees of conduction angles) B-2, and the zero cross control C is shown.

[0096]

** In the case [:P] only of zero cross control When the It value 2.161** above-mentioned control is carried out It depends It value 0.62, the Plt value (0.65 or less) which is flicker specification by carrying out the above-mentioned control can be cleared, and it is control effective in a flicker response. :P

[0097]

[Effect of the Invention] As described above, in invention according to claim 1, at the time of actuation initiation of a heater, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed by controlling full wave phase control B-2 between time amount T3 for the full wave phase control B1 between time amount T2 in this order, combining the zero cross actuation control C between time amount T four in 1 between time amount T1 / 3 wave phase control A.

[0098] At the time of heater actuation initiation, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by considering as 90 degrees or less in invention according to claim 2.

[0099] In invention according to claim 3, by considering as 1 or less second, the time amount of the time amount of the time amount T2 of the full wave phase control B1 can suppress generating for a noise more, and can reduce the rush current.

[0100] In invention according to claim 4, when two or more heaters exist, by forbidding ON, when other heaters are turned off, generating of the noise at the time of heater actuation can be suppressed more between time amount T1, time amount T2, and time amount T3, and it can suppress the rush current.

[0101] In invention according to claim 5, at the time of actuation initiation of a heater, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed by controlling 1 between time amount T1 / 3 wave phase control A combining the zero cross actuation control C between time amount T2 in this order.
[0102] At the time of heater actuation initiation, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by considering as 90 degrees or less in invention according to claim 6.
[0103] In invention according to claim 7, when two or more heaters exist, by forbidding ON, when other heaters are turned off, generating of the noise at the time of heater actuation can be suppressed more between time amount T1, and it can suppress the rush current.
[0104] In invention according to claim 8, at the time of actuation initiation of a heater, generating of the noise at the time of heater actuation can be suppressed, and the rush current can be suppressed by controlling the full wave phase control B between time amount T2 for 1 between time amount T1 / 3 wave phase control A combining the zero cross actuation control C between time amount T3 in this order.
[0105] In invention according to claim 9, at the time of heater actuation initiation, both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by considering as 90 degrees or less.
[0106] In invention according to claim 10, by considering as 1 or less second, the time amount of the time amount T2 of the full wave phase control B can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current.
[0107] In invention according to claim 11, between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out full wave phase control B, when turned off, actuation of other heaters can suppress generating of the noise at the time of heater actuation more, and can suppress the rush current by forbidding ON.

[Translation done.]

TECHNICAL FIELD

[Field of the Invention] This invention relates to the heater driving gear of the device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] Conventionally, there is a thing equipped with the anchorage device which has a heater as a heat source inside a heating roller in a copying machine, and the heater drive of this anchorage device is the zero cross point with which the sinusoidal supply voltage of a source power supply becomes zero, and is driving the heater 1 to 3 times to two - four half waves of that frequency period the early stages of a drive.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] As described above, in invention according to claim 1, at the time of drive initiation of a heater, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed by controlling full wave phase control B-2 between time amount T3 for the full wave phase control B1 between time amount T2 in this order, combining the zero cross drive control C between time amount T four in 1 between time amount T1 / 3 wave phase control A.
[0098] At the time of heater drive initiation, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by considering as 90 degrees or less in invention according to claim 2.
[0099] In invention according to claim 3, by considering as 1 or less second, the time amount of the time amount of the time amount T2 of the full wave phase control B1 can suppress generating for a noise more, and can reduce the rush current.
[0100] In invention according to claim 4, when two or more heaters exist, by forbidding ON, when other heaters are turned off, generating of the noise at the time of a heater drive can be suppressed more between time amount T1, time amount T2, and time amount T3, and it can suppress the rush current.
[0101] In invention according to claim 5, at the time of drive initiation of a heater, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed by controlling 1 between time amount T1 / 3 wave phase control A combining the zero cross drive control C between time amount T2 in this order.
[0102] At the time of heater drive initiation, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by considering as 90 degrees or less in

invention according to claim 6.

[0103] In invention according to claim 7, when two or more heaters exist, by forbidding ON, when other heaters are turned off, generating of the noise at the time of a heater drive can be suppressed more between time amount T1, and it can suppress the rush current.

[0104] In invention according to claim 8, at the time of drive initiation of a heater, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed by controlling the full wave phase control B between time amount T2 for 1 between time amount T1 / 3 wave phase control A combining the zero cross drive control C between time amount T3 in this order.

[0105] In invention according to claim 9, at the time of heater drive initiation, both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by considering as 90 degrees or less.

[0106] In invention according to claim 10, by considering as 1 or less second, the time amount of the time amount T2 of the full wave phase control B can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current.

[0107] In invention according to claim 11, between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out full wave phase control B, when turned off, the drive of other heaters can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by forbidding ON.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Since the conventional heater drive turns on a heater on the zero cross point on which sinusoidal supply voltage becomes zero, the rush current generates it. In order to suppress the rush current, there is a heater driving gear turned on and off according to the conduction angle of sinusoidal supply voltage. in this heater driving gear, although the rush current can be suppressed to some extent until, in order to turn on and off according to the conduction angle of sinusoidal supply voltage, there is a possibility of a noise occurring and causing malfunction of an electromagnetic interference or a device.

[0004] This invention aims at offering the heater driving gear which it was made in view of this actual condition, and generating of the noise at the time of a heater drive is suppressed, and can suppress the rush current.

[Translation done.]

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MEANS

[Means for Solving the Problem] In order to solve said technical problem and to attain the purpose, this invention was constituted as follows.
[0006] In the heater driving gear of the device by which invention according to claim 1 equips the interior of "heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of drive initiation of a heater, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave drive control is carried out between time amount T2. Full wave phase control B-2 of the heater which combined the phase control which makes a conduction angle less than 180 degrees, and full wave drive control is carried out between time amount T3. time amount -- T four -- between -- a sine wave -- supply voltage -- zero -- becoming -- a zero cross -- the point -- a heater -- turning on -- a zero cross -- a drive -- control -- C -- said -- one -- /-- three -- a wave -- phase control -- A -- a full wave -- phase control -- B -- one -- a full wave -- phase control -- B-2 -- a zero cross -- a drive -- control -- C -- order -- controlling -- things -- the description -- ** -- carrying out -- a heater -- a driving gear -- " -- it is .
[0007] According to this invention according to claim 1, at the time of drive initiation of a heater, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed by controlling full wave phase control B-2 between time amount T3 for the full wave phase control B1 between time amount T2 in this order, combining the zero cross drive control C between time amount T four in 1 between time amount T1 / 3 wave phase control A.
[0008] Invention according to claim 2 is "a heater driving gear according to claim 1 characterized by making the conduction angle of the phase control section of said 1 / 3 wave phase control A into 90 degrees or less."
[0009] According to this invention according to claim 2, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by considering as 90 degrees or less at the time of heater drive initiation.
[0010] Invention according to claim 3 is "a heater driving gear according to claim 1 or 2 characterized by making time amount of the time amount of the time amount T2 of said full wave phase control B1 into 1 or less second."
[0011] According to this invention according to claim 3, by considering as 1 or less second, the time amount of the time amount of the time amount T2 of the full wave phase control B1 can suppress generating for a noise more, and can reduce the rush current.
[0012] The time amount T1 to which invention according to claim 4 is carrying out 1 / 3 wave phase control A when the heater of "plurality exists, a full wave -- phase control -- B -- one -- carrying out -- **** -- time amount -- T -- two -- a full wave -- phase control -- B-2 -- carrying out -- **** -- time amount -- T3 -- between -- others -- a heater -- a drive -- turning off -- having -- **** -- a case -- ON -- forbidding -- things -- the description -- ** -- carrying out -- being according to claim 1 to 3 -- a heater -- a driving gear -- " -- it is .
[0013] When two or more heaters exist according to this invention according to claim 4, by forbidding ON, when other heaters are turned off, generating of the noise at the time of a heater drive can be suppressed more between time amount T1, time amount T2, and time amount T3, and it can suppress the rush current.
[0014] In the heater driving gear of the device by which invention according to claim 5 equips the interior of "heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of heater drive initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. time amount -- T -- two -- between -- a sine wave -- supply voltage -- ZE -- opening -- becoming -- a zero cross -- the point -- a heater -- turning on -- a zero cross -- a drive -- control -- C -- said -- one -- /-- three -- a wave -- phase control -- A -- a zero cross -- a drive -- control -- C -- order -- controlling -- things -- the description -- ** -- carrying out -- a heater -- a driving gear -- " -- it is .
[0015] According to this invention according to claim 5, at the time of drive

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initiation of a heater, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed by controlling 1 between time amount T1 / 3 wave phase control A combining the zero cross drive control C between time amount T2 in this order.

[0016] Invention according to claim 6 is "a heater driving gear according to claim 5 characterized by making the conduction angle of the phase control section of said 1 / 3 wave phase control A into 90 degrees or less."

[0017] According to this invention according to claim 6, between time amount T1, the conduction angle of the phase control section of 1 / 3 wave phase control A can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by considering as 90 degrees or less at the time of heater drive initiation.

[0018] Invention according to claim 7 is "a heater driving gear according to claim 5 or 6 characterized by forbidding ON between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist when the drive of other heaters is turned off."

[0019] When two or more heaters exist according to this invention according to claim 7, by forbidding ON, when other heaters are turned off, generating of the noise at the time of a heater drive can be suppressed more between time amount T1, and it can suppress the rush current.

[0020] In the heater driving gear of the device by which invention according to claim 8 equips the interior of "heating roller with the anchorage device which has a heater as a heat source The phase control which turns a heater on and off according to the conduction angle of sinusoidal supply voltage between predetermined time T1 at the time of heater drive initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B of the heater which combined phase control and full wave drive control is carried out between predetermined time T2. predetermined time -- T3 -- between -- a sine wave -- supply voltage -- ZE -- opening -- becoming -- a zero cross -- the point -- a heater -- turning on -- a zero cross -- a drive -- control -- C -- said -- one -- /-- three -- a wave -- phase control -- A -- a full wave -- phase control -- B -- a zero cross -- a drive -- control -- C -- order -- controlling -- things -- the description -- ** -- carrying out -- a heater -- a driving gear -- " -- it is .

[0021] According to this invention according to claim 8, at the time of drive initiation of a heater, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed by controlling the full wave phase control B between time amount T2 for 1 between time amount T1 / 3 wave phase control A combining the zero cross drive control C between time amount T3 in this order.

[0022] Invention according to claim 9 is "a heater driving gear according to claim 8 characterized by making both the conduction angles of the phase control section B of said 1 / 3 wave phase control A, and full wave phase control into 90 degrees or less."

[0023] According to this invention according to claim 9, at the time of heater drive initiation, both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current by considering as 90 degrees or less.

[0024] Invention according to claim 10 is "a heater driving gear according to claim 8 or 9 characterized by making time amount of the time amount T2 of said full wave phase control B into 1 or less second."

[0025] According to this invention according to claim 10, by considering as 1 or less second, the time amount of the time amount T2 of the full wave phase control B can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current.

[0026] Invention according to claim 11 is "a heater driving gear according to claim 8 to 9 characterized by forbidding ON between the time amount T1 which is carrying out said 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out said full wave phase control B when the drive of other heaters is turned off."

[0027] Between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist according to this invention according to claim 11, and the time amount T2 which is carrying out full wave phase control B, when turned off, by forbidding ON, the drive of other heaters can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current.

[0028]

[Embodiment of the Invention] Hereafter, the gestalt of operation of the heater driving gear of this invention is explained based on a drawing.

[0029] Drawing 1 is the outline block diagram of a copying machine as a device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source.

[0030] First, the usual copy actuation of this copying machine is explained. This copying machine consists of the image reading unit 10, the write-in unit 20 which is a digital write-in system, the image formation section 30, the feed section 40, and manuscript installation section 50 grade.

[0031] There are the manuscript base 51 which consists of a transparent glass plate etc., and the manuscript installation section 50 which consists of wrap manuscript covering 52 grade the manuscript D further laid on the manuscript base 51 in the copying machine upper part, it is the lower part of the manuscript base 51, and the image reading unit 10 which consists of

JP,11-272103,A [MEANS] http://www4.ipdl.ncipi.go.jp/cgi-bin/tran_web_cgi_ejje

image sensor 15 grades, such as the 1st mirror unit 12, the 2nd mirror unit 13, the image pick-up lens 14, and a CCD array, is formed in the body of equipment.

[0032] The parallel displacement to the location which shows the image of the manuscript D on the manuscript base 51 with a broken line from the continuous line of the 1st mirror unit 12 equipped with lighting lamp 12A and 1st mirror 12B of the image reading unit 10, Imitation migration of the rate of 1/2 to the 1st mirror unit 12 of the 2nd mirror unit 13 which counters and is equipped with 2nd mirror 13A and 3rd mirror 13B in one carries out the lighting scan of the whole surface. Image formation of the image is carried out on an image sensor 15 through 1st mirror 12B, 2nd mirror 13A, and 3rd mirror 13B with the image pick-up lens 14. After a scan finishes, the 1st mirror unit 12 and the 2nd mirror unit 13 stand by till return and the next image formation in the original location.

[0033] After the image data which photo electric conversion was carried out and was obtained by the image sensor 15 is changed into a digital signal, an image processing is made by the picture signal processing section 60, and it is once stored in memory 61 as a picture signal. Subsequently, a picture signal is inputted into the trailer lump unit 20 in which Pulse Density Modulation was read and carried out by control of a control section 62 from memory 61.

[0034] The image formation section 30 will start image recording actuation, if a picture signal is inputted into the write-in unit 20 which consists of a drive motor 27, the polygon mirror 22, the ftheta lens 23, mirrors 24, 25, and 26 and semiconductor laser that is not illustrated, correcting lens 24B, etc. by control of a control section 62. That is, the photo conductor drum 31 which is image support rotates clockwise like ****, and since the charge is given to the electric discharge discharge electricity by performing an electrification pre-exposure with the electrification vessel 32 after it is discharged with the electric discharge vessel 36, on the photo conductor drum 31, the electrostatic latent image corresponding to the image of Manuscript D is formed of a laser beam L by the write-in unit 20. Then, with the developer supported on development sleeve 33A which is the developer support which impressed the bias voltage of a development counter 33, reversal development is performed and said electrostatic latent image on the photo conductor drum 31 turns into a visible toner image.

[0035] On the other hand, from sheet paper cassette 41A**41B with which the feed section 40 was loaded, it takes out one sheet at a time the transfer paper P of the appointed size by taking-out roller 42A, and paper is fed toward the imprint section of an image through the taking-out roller 43 and the guide member 42. Therefore, the transfer paper P to which paper was fed is sent out to the resist roller 44 which operates synchronizing with the toner image on the photo conductor drum 31 on the photo conductor drum 31. After the toner image on the photo conductor drum 31 was imprinted by the operation of the imprint machine 34, and being separated into this transfer paper P from on the photo conductor drum 31 by the electric discharge operation of an eliminator 35, being sent to an anchorage device 37 through the conveyance belt 45 and carrying out melting fixing with a fixing roller 100 and the pressurization roller 200, it is discharged with the delivery rollers 38 and 46 to the tray 54 besides equipment. 53 is a feed base for manual bypass.

[0036] said photo conductor drum 31 should boil the toner which remained without continuing rotation further and the front face imprinting electrification machine 32, after removal cleaning is carried out by cleaning-blade 39A which carries out a pressure welding in cleaning equipment 39 and electricity is again discharged with the electric discharge vessel 36 -- in response to grant of a charge, it goes into Mr. Lee at the process of next image formation.

[0037] In addition, the permeability sensor TS formed in the pars basilaris ossis occipitalis of stirring screw 33C of a development counter 33 is a sensor which will supervise the toner concentration of the developer in a development counter 33 using permeability changing if the toner concentration of a developer changes, and sends out the toner concentration information on a developer to a control section 62. Since a control section 62 will send out directions of toner supply to a toner supply unit and will perform toner supply if ** RITONA concentration decreases to the information on the permeability sensor TS below at constant value, the toner concentration of a developer is always uniformly maintainable.

[0038] Next, an anchorage device 37 is explained based on drawing 2 . Drawing 2 is the sectional view showing an anchorage device.

[0039] In the casing 300 of an anchorage device 37, the pressurization roller 200 and the fixing roller 100 which constitutes a heating roller are arranged. The silicone rubber layer 231 is formed in the barrel 230 of SUS, and, as for the pressurization roller 200, one heater H1 is arranged inside the barrel 230. A fixing roller 100 coats and forms the resin layer 141 in the barrel 140 of aluminum, and two heaters H2 are arranged inside the barrel 140 of aluminum.

[0040] The oil of the oil spreading pad 150 is applied to a fixing roller 100 with the oil spreading roller 151, and the recording paper enables it to exfoliate easily at the time of fixing. Moreover, to a fixing roller 100, a cleaning roller 152 contacts, and is arranged and ******, dust, etc. of a toner which form the image adhering to a fixing roller 100 are removed.

[0041] The guide plate 153,154 which guides conveyance of the recording paper is formed in the conveyance direction upstream of the recording paper

to the pressurization roller 200 and a fixing roller 100, and the Kamisada arrival pawl 155 and the bottom fixing pawl 156 are formed in the conveyance direction downstream.

[0042] Furthermore, near the pressurization roller 200, the temperature detection sensor which is the pressurization roller temperature detection means S1 is formed, the temperature detection sensor which is the fixing roller temperature detection means S2 is formed near the fixing roller 100, and the heater H1 of the pressurization roller 200 and the heater H2 of a fixing roller 100 are controlled by the control section 62 based on the temperature information acquired from this temperature detection sensor.

[0043] Drawing 3 is the outline block diagram of a heater driving gear. The control section 62 consists of the temperature control section 620, a heater control section 621, and a heater mechanical component 622,623. The temperature control section 620 acquires the temperature information from the pressurization roller temperature detection means S1 and the fixing roller temperature detection means S2, and sends each temperature information to the heater control section 621.

[0044] The heater control section 621 controls the heater mechanical component 622,623 based on the temperature information sent from the temperature control section 620. The heater mechanical component 622 carries out phase control, and drives the heater H1 of the pressurization roller 200. The heater mechanical component 623 wears, and drives the heater H2 of a roller 100, and this heater H2 is two or more two. The supply voltage E of a source power supply is impressed to a heater H1 and a heater H2.

[0045] Next, control of the heater control section 621 is explained to a detail based on drawing 4 thru/or drawing 7 .

[0046] Drawing 4 is drawing explaining 1 / 3 wave phase control A.

[0047] The supply voltage E of the source power supply of an alternating current is impressed (drawing 4 (a)), and 1 / 3 wave phase control A of the heater which combined the phase control (drawing 4 (b)) which turns a heater on and off according to the conduction angle of sinusoidal supply voltage, and 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out between time amount T1 at the time of drive initiation of a heater (drawing 4 (c)).

[0048] Drawing 5 is drawing explaining the full wave phase control B1.

[0049] The supply voltage E of the source power supply of an alternating current is impressed (drawing 5 (a)), and full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave drive control is carried out between time amount T2 at the time of drive initiation of a heater (drawing 5 (b), (c)).

[0050] Drawing 6 is drawing explaining full wave phase control B-2.

[0051] The supply voltage E of the source power supply of an alternating current is impressed (drawing 6 (a)), and full wave phase control B-2 of the heater which combined the phase control which makes a conduction angle less than 180 degrees, and full wave drive control is carried out between time amount T3 at the time of drive initiation of a heater (drawing 6 (b), (c)).

[0052] Drawing 7 is drawing explaining the zero cross drive control C.

[0053] The supply voltage E of the source power supply of an alternating current is impressed (drawing 7 (a)), and zero cross drive control C which turns on a heater on the zero cross point on which sinusoidal supply voltage becomes zero is carried out between time amount T four at the time of drive initiation of a heater (drawing 7 (b), (c)).

[0054] The phase control to which invention according to claim 1 to 4 turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of drive initiation of a heater, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B1 of the heater which combined the phase control which makes a conduction angle 90 degrees or less, and full wave drive control is carried out between time amount T2. Full wave phase control B-2 of the heater which combined the phase control which makes a conduction angle less than 180 degrees, and full wave drive control is carried out between time amount T3. The zero cross drive control C which turns on a heater is controlled by the zero cross point on which sinusoidal supply voltage becomes zero between time amount T four in order of said 1 / 3 wave phase control A, the full wave phase control B1, full wave phase control B-2, and the zero cross drive control C.

[0055] Thus, at the time of drive initiation of a heater, by controlling full wave phase control B-2 between time amount T3 for the full wave phase control B1 between time amount T2 in this order, combining the zero cross drive control C between time amount T four in 1 between time amount T1 / 3 wave phase control A, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed.

[0056] Moreover, generating of the noise at the time of a heater drive can be suppressed [by making the conduction angle of the phase control section of 1 / 3 wave phase control A into 90 degrees or less] more by making the conduction angle of the phase control section of 1 between time amount T1 / 3 wave phase control A into 90 degrees or less at the time of heater drive initiation, and the rush current can be suppressed.

[0057] Moreover, time amount of the time amount of the time amount T2 of the full wave phase control B1 is made into 1 or less second, and by considering as 1 or less second, the time amount of the time amount of the time amount T2 of the full wave phase control B1 can suppress generating

for a noise more, and can reduce the rush current.

[0058] Moreover, the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, Between the time amount T2 which is carrying out full wave phase control B1, and time amount T3 which is carrying out full wave phase control B-2 When the drive of other heaters forbids ON when turned off, and two or more heaters exist, between time amount T1, time amount T2, and time amount T3 By forbidding ON, when turned off, other heaters can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current.

[0059] The phase control to which invention according to claim 5 to 7 turns a heater on and off according to the conduction angle of sinusoidal supply voltage between time amount T1 at the time of heater drive initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. The zero cross drive control C which turns on a heater is controlled by the zero cross point on which sinusoidal supply voltage becomes ZE opening between time amount T2 in order of 1 / 3 wave phase control A, and the zero cross drive control C.

[0060] Thus, at the time of drive initiation of a heater, by controlling 1 between time amount T1 / 3 wave phase control A combining the zero cross drive control C between time amount T2 in this order, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed.

[0061] Moreover, generating of the noise at the time of a heater drive can be suppressed [by making the conduction angle of the phase control section of 1 / 3 wave phase control A into 90 degrees or less] more by making the conduction angle of the phase control section of 1 between time amount T1 / 3 wave phase control A into 90 degrees or less at the time of heater drive initiation, and the rush current can be suppressed.

[0062] Moreover, when the drive of other heaters forbids ON between the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist when turned off, and two or more heaters exist, by forbidding ON, when other heaters are turned off, generating of the noise at the time of a heater drive can be suppressed more between time amount T1, and it can suppress the rush current.

[0063] The phase control to which invention according to claim 8 to 11 turns a heater on and off according to the conduction angle of sinusoidal supply voltage between predetermined time T1 at the time of heater drive initiation, 1 / 3 wave phase control A of the heater which combined 1 / 3 wave drive control which makes the half wave of a sine wave one wave, and is driven once on three waves are carried out. Full wave phase control B of the heater which combined phase control and full wave drive control is carried out between predetermined time T2. The zero cross drive control C which turns on a heater is controlled by the zero cross point on which sinusoidal supply voltage becomes ZE opening between predetermined time T3 in order of said 1 / 3 wave phase control A, the full wave phase control B, and the zero cross drive control C.

[0064] Thus, at the time of drive initiation of a heater, by controlling the full wave phase control B between time amount T2 for 1 between time amount T1 / 3 wave phase control A combining the zero cross drive control C between time amount T3 in this order, generating of the noise at the time of a heater drive can be suppressed, and the rush current can be suppressed.

[0065] Moreover, generating of the noise at the time of a heater drive can be suppressed [by making both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control into 90 degrees or less] more by making both the conduction angles of the phase control section B of 1 / 3 wave phase control A, and full wave phase control into 90 degrees or less at the time of heater drive initiation, and the rush current can be suppressed.

[0066] Moreover, generating of the noise at the time of a heater drive can be suppressed more by making time amount of the time amount T2 of the full wave phase control B into 1 or less second by making time amount of the time amount T2 of the full wave phase control B into 1 or less second, and the rush current can be suppressed.

[0067] Moreover, the drive of the heater of others [between / the time amount T1 which is carrying out 1 / 3 wave phase control A when two or more heaters exist, and the time amount T2 which is carrying out full wave phase control B] When are turned off, and ON is forbidden and two or more heaters exist, Between the time amount T1 which is carrying out 1 / 3 wave phase control A, and the time amount T2 which is carrying out full wave phase control B, when turned off, by forbidding ON, the drive of other heaters can suppress generating of the noise at the time of a heater drive more, and can suppress the rush current.

[0068] Next, the example of control of the heater control section 621 is explained to a detail based on drawing 8 .

[0069] The contents of heater control are as follows.

[0070] Maine heater H2: Carry [** full wave phase control B1 (it is a conduction angle 72 degrees)] out ** zero cross drive control C for ** full wave phase control B-2 (it is a conduction angle 144 degrees) in order of **->**->**->** between operation and time amount 6.0sec between operation and time amount 1.0sec between time amount 1.5sec(s) between **| / 3 wave phase control A operation, and time amount 0.5sec at the time of heater drive initiation.

[0071] ** While carrying out control of ** and **, the subheater H2 and the

bottom heater H1 forbid ON, when off.

[0072] Subheater H2: At the time of heater drive initiation, carry out [B] zero cross drive control C between [A] I / 3 wave phase control A, and 1.5sec between time amount 1.5sec(s), and carry out [C] zero cross drive control C between time amount 3.3sec(s). While carrying out [A] and [B] control, the Maine heater H2 and the bottom heater H1 forbid ON, when off.

[0073] Bottom heater H1: At the time of heater drive initiation, carry out [E] zero cross drive control C between 1.5sec(s) between [D] I / 3 wave phase control A operation, and 1.5sec, and carry out [F] zero cross drive control C between time amount 3.3sec(s). While carrying out [D] and [E] control, the Maine heater H2 and the subheater H2 forbid ON, when off.

[0074] At the time of phase control implementation, only phase control is carried out by **I / 3 wave phase control, and, in ON of a heater, it becomes an improvement of the rush current at 90 degrees or less of conduction angles, but a higher harmonic is affected. In ON [a conduction angle] of a heater at 90 degrees or more less than 180 degrees, a higher harmonic is not affected, but an improvement of the rush current also decreases.

[0075] Then, in order to lessen and to improve the rush current, effect on a higher harmonic is used as 72 degrees (90 degrees or less) of conduction angles, and carries out 1 / 3 wave phase control combined with 1 / 3 wave drives.

[0076] ** When ** zero cross drive control or full wave phase control (less than 180 degrees of 90-degree or more conduction angles) is carried out after **I / 3 wave phase control by full wave phase control (72 degrees of conduction angles), since the temperature of a heater is low, the rush current is large. ** Even if it extends the time amount of I / 3 wave phase control, since the temperature of a heater is saturated, the rush current is not suppressed.

[0077] Then, the rush current is suppressed by carrying out full wave phase control of 72 degrees of conduction angles (90 degrees or less of conduction angles). However, since the full wave phase control of 90 degrees or less of conduction angles affects a higher harmonic, 0.5 or more secs are inextensible.

[0078] ** By carrying out full wave phase control of 144 degrees of conduction angles (less than 180 degrees of 90-degree or more conduction angles) by full wave phase control (144 degrees of conduction angles) after the full wave phase control of 72 degrees of conduction angles (90 degrees or less of conduction angles), and carrying out zero cross drive control, the rush current can be suppressed rather than it carries out zero cross drive control after the full wave phase control of 72 degrees of conduction angles.

[0079] Next, as a cure of the flicker specification in CE specification (EN 61000-33), phase control was carried out and the Plt value estimated.

[0080]

Plt value (long duration flicker value): -- 0.65 or less value-of-standard Pst value (short-time flicker value): -- a 1.00 or less value-of-standard Plt value takes Pst under idling for 12 times = 2 hours, and carries out a cube average.

[0081] A Plt value is the measured value computed from the voltage variation by the rush current, and a measurement result is measured automatically with the flicker measuring instrument of drawing 9 .

[0082] Flicker measurement is equipped with the automatic gain control circuit AGC, and it doubles the actual value Vrms of input voltage with reference voltage (the present instrument test voltage), without affecting "deltaV/V." It has the response time for 60 seconds (time amount which changes to 10->90% of the range of fluctuation) to stair-like fluctuation of the actual value Vrms of input voltage. Before automatic gain control circuit AGC / back can be chosen as the value of the actual value Vrms which a flicker measuring instrument outputs. When a front is chosen, the true RMS of input voltage can be measured.

[0083] A flicker is saying the unstable feeling of the vision to which the brightness or spectrum distribution of a luminescence object is caused in order to change with time amount, for example, lighting's flickering, and feeling unpleasant etc. When this occurs by fluctuation of the supply voltage of lighting, it is flicker meter, and in addition, having been designed so that this voltage variation could be measured on the basis of people's general feeling is based on the flicker with the lamp (60W-230V) of a coiled form filament, and it is.

[0084] The short flicker value Pst calls the value (flicker severe RITI) which shows people's sensitivity over a flicker measured for a short period of time (IEC standards prescribe for 10 minutes) the short flicker value Pst. Pst=I is the general value of sensitivity and makes this value a limit value in IEC standards.

[0085] A flicker value Plt is computed for a long period of time using the measured Pst value which carried out long duration (Pst measurement is specified as 12 time =2 hour by IEC standards) continuation. This is the value (flicker severe RITI) which shows the sensitivity over people's flicker, and calls it a flicker value Plt for a long period of time. Application of a limit value is exempted from the device for 30 or less minutes to 1 time of a usual time (except for the device to which it is IEC standards and having examined especially was directed).

[0086] Flicker meter is equipped with the filter which carries out weighting to voltage variation according to the property of the vision of the lamp made into the criteria of a flicker, and a man. The output of this filter is weighting electrical-potential-difference change "W-delta V/V", and is required of IEC

standards as an output of flicker meter.
[0087] Instant flicker value S (t) is the unit which made people's average consciousness sensibility the scale, and is setting to 1 (P. U.) the minimum value in which what people sense is possible. Unit P.U. is Perceptibility. It is the abbreviation for Unit (consciousness unit).
[0088] rootS (t) is the extraction of the square root of S (t), and outputs the value proportional to deltaV/V. A unit is R.U. rootS (t) is the I minute integral value of S (t), and a unit is P.U.
[0089] the accumulation probability music into which the accumulation probability Pis (P0.1, P1s, P3s, P10s, P50s) classified 1024 classes instant flicker value S (t) -- it is used in order to ask and to calculate the short flicker value Pst, since green.
[0090] Flicker Pst measurement mode is shown below.
[0091] Actuation: It is adaptation] to the evaluation approach (short flicker severe RITI evaluation of flicker direct measurement) of [IEC 1000-3-3,868,868-0.
measuring-time: -- renewal rate of the selection display from for [between / I part / -] 15 minutes (I part spacing): -- measured value -- about I times (a fluctuation graph is a real-time display)/second
Measurement result: ** fluctuation graph [the fluctuation graph (a part for for a maximum of 15 minutes) of a basic parameter (except for integralS (t)), a Pst value, and a judgment result]
** The maximum, minimum value and average, accumulation probability P0.1, P1s, P3s, P10s, P50s, and Pst value and judgment result operation expression of a measured-value [basic parameter (integrals [rootS (t) and] (t) remove) :P st=root (K1P0.1+K2P1 S+K3P3 S+K4P 10 S+K5P50S)
However, K1=0.0314, K2=0.0525, K3=0.0657, K4=0.28, and K5=0.08
accumulation stochastic function (CPF) classification 1024 class each accumulation probability (Pi) are searched for by the linear interpolation method. Furthermore, the accumulation probability (Pis) graduated by the following approaches Calculation P1S= (P0.7+P1+P105)/3, P3S= (P2.2+P33+P4) /3P10S= It is adaptation] to (P6+P8+P10+P13+P17)/5 and the evaluation approach (prolonged flicker severe RITI evaluation of flicker direct measurement) of p50s=(P30+P50+P80)/3 flicker Plt measurement mode actuation:[IECI 000-3-3-868.868-0.
From N:two - 1008 Pst measurement counts to the renewal rate of a selection display: Measured value is about I times (a fluctuation graph is a real-time display)/second.
Measurement result: ** fluctuation graph [the fluctuation graph of a Pst value, a Plt value, and a judgment result]
** Measured value [the maximum and the minimum value of a basic parameter (integrals [rootS (t) and] (t) remove), a Plt value, and a judgment result]
** It is P0.1, P1S, P3S, P10S, P50S, Pst value, and judgment result] by the Pst list [measurement count.
Operation expression-It=root[(sigma (Psti) / N])
However, a 1-/N wave control measurement result when N uses one heater of fixing of measurement count 850W is shown in Table 1.
[0092] Table 1 [0093]

	条件	Plt値
①	ゼロクロス駆動制御	1.364
②	1/2波	0.889
③	1/3波	0.78
④	1/4波	0.899
⑤	2/4波	1.108

[0094] From the above result, 1 / 3 wave phase control A driven once to 3 times are carried out at the time of heater drive initiation.
[0095] The Plt measurement result at the time of carrying out drive control of a heater at the heater of fixing of 1380W in order of 1 / 3 wave phase control A, the full wave phase control (90 degrees or less of conduction angles) B1, full wave phase control (less than 180 degrees of conduction angles) B-2, and the zero cross control C is shown.
[0096]
** In the case [:P] only of zero cross control When the It value 2.161** above-mentioned control is carried out It depends It value 0.62, the Plt value (0.65 or less) which is flicker specification by carrying out the above-mentioned control can be cleared, and it is control effective in flicker correspondence. :P

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the outline block diagram of a copying machine as a device which equips the interior of a heating roller with the anchorage device which has a heater as a heat source.
[Drawing 2] It is the sectional view showing an anchorage device.
[Drawing 3] It is the outline block diagram of a heater driving gear.
[Drawing 4] It is drawing explaining 1 / 3 wave phase control A.
[Drawing 5] It is drawing explaining the full wave phase control B1.
[Drawing 6] It is drawing explaining full wave phase control B-2.
[Drawing 7] It is drawing explaining the zero cross drive control C.
[Drawing 8] It is drawing explaining the example of control of a heater control section.
[Drawing 9] It is the block diagram showing a flicker measuring instrument.
[Description of Notations]
62 Control Section
620 Temperature Control Section
621 Heater Control Section
622,623 Heater mechanical component
S1 Pressurization roller temperature detection means
S2 Fixing roller temperature detection means
A 1 / 3 wave phase control
B1 Full wave phase control
B-2 Full wave phase control
C Zero cross drive control
H1 Heater of the pressurization roller 200
H2 Heater of a fixing roller 100

[Translation done.]